

US EPA RECORDS CENTER REGION 5



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COUNSEL TO GREAT COMPANIES

EPA 30(b)(6)

Weyerhaeuser Exhibits

March 19, 2015





**UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION**

**GEORGIA-PACIFIC CONSUMER PRODUCTS, LP,
FORT JAMES CORPORATION, and
GEORGIA-PACIFIC, LLC,**

Plaintiffs,

v.

**NCR CORPORATION,
INTERNATIONAL PAPER COMPANY, and
WEYERHAEUSER COMPANY,**

Defendants.

Civil Action No. 1:11-cv-483

Judge Robert J. Jonker

PLAINTIFFS' NOTICE OF DEPOSITION OF USEPA, REGION 5

To: COUNSEL FOR ALL PARTIES

PLEASE TAKE NOTICE that Plaintiffs will take the oral deposition of a designee of the **United States Environmental Protection Agency, Region 5** on **November 7, 2014**, beginning at **9:00 a.m.**, at the offices of **Mayer Brown, 71 S. Wacker Drive, Chicago, Illinois, 60606**, before a duly authorized officer certified to administer oaths and take depositions.

The deposition will be recorded by stenographic and/or videographic means and will be taken for the purpose of discovery, for use as evidence at any hearing or trial, and for any other purposes authorized by law. You are invited to attend and cross-examine.

Dated: October 17, 2014

**GEORGIA-PACIFIC CONSUMER PRODUCTS,
LP., FORT JAMES CORPORATION, and
GEORGIA-PACIFIC LLC**

By: /s/ George P. Sibley, III

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CERTIFICATE OF SERVICE

I hereby certify that on October 17, 2014, I caused a copy of the foregoing to be sent to counsel for each party via e-mail.

By: /s/ George P. Sibley, III

UNITED STATES DISTRICT COURT

for the

Western District of Michigan

Georgia-Pacific Consumer Products, LP, et al.

Plaintiff

v.

NCR Corporation, et al.

Defendant

Civil Action No. 1:11-cv-483

SUBPOENA TO TESTIFY AT A DEPOSITION IN A CIVIL ACTION

To:

United States Environment Protection Agency, Region 5

(Name of person to whom this subpoena is directed)

☒ **Testimony:** YOU ARE COMMANDED to appear at the time, date, and place set forth below to testify at a deposition to be taken in this civil action. If you are an organization, you must designate one or more officers, directors, or managing agents, or designate other persons who consent to testify on your behalf about the following matters, or those set forth in an attachment:

Please see the attached Schedule A for a list of deposition topics.

Place: Mayer Brown 71 S. Wacker Drive Chicago, IL 60606	Date and Time: 11/7/2014 9:00 am
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The deposition will be recorded by this method: Stenography and Video

☐ **Production:** You, or your representatives, must also bring with you to the deposition the following documents, electronically stored information, or objects, and must permit inspection, copying, testing, or sampling of the material:

The following provisions of Fed. R. Civ. P. 45 are attached – Rule 45(c), relating to the place of compliance; Rule 45(d), relating to your protection as a person subject to a subpoena; and Rule 45(e) and (g), relating to your duty to respond to this subpoena and the potential consequences of not doing so.

Date: 10/17/2014

CLERK OF COURT

OR

Signature of Clerk or Deputy Clerk

Attorney's signature

The name, address, e-mail address, and telephone number of the attorney representing *(name of party)* Georgia-Pacific

, who issues or requests this subpoena, are:
George P. Sibley, III, 951 E. Bryd Street, Richmond, VA 23219, gsibley@hunton.com, 804-788-8200

Notice to the person who issues or requests this subpoena

If this subpoena commands the production of documents, electronically stored information, or tangible things before trial, a notice and a copy of the subpoena must be served on each party in this case before it is served on the person to whom it is directed. Fed. R. Civ. P. 45(a)(4).

Civil Action No. 1:11-cv-483

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 45.)

I received this subpoena for *(name of individual and title, if any)* _____
on *(date)* _____.

☐ I served the subpoena by delivering a copy to the named individual as follows: _____

_____ on *(date)* _____; or

☐ I returned the subpoena unexecuted because: _____

Unless the subpoena was issued on behalf of the United States, or one of its officers or agents, I have also
tendered to the witness the fees for one day's attendance, and the mileage allowed by law, in the amount of
\$ _____.

My fees are \$ _____ for travel and \$ _____ for services, for a total of \$ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

Server's signature

Printed name and title

Server's address

Additional information regarding attempted service, etc.:

Federal Rule of Civil Procedure 45 (c), (d), (e), and (g) (Effective 12/1/13)

(c) Place of Compliance.

(1) *For a Trial, Hearing, or Deposition.* A subpoena may command a person to attend a trial, hearing, or deposition only as follows:

- (A) within 100 miles of where the person resides, is employed, or regularly transacts business in person; or
- (B) within the state where the person resides, is employed, or regularly transacts business in person, if the person
 - (i) is a party or a party's officer; or
 - (ii) is commanded to attend a trial and would not incur substantial expense.

(2) *For Other Discovery.* A subpoena may command:

- (A) production of documents, electronically stored information, or tangible things at a place within 100 miles of where the person resides, is employed, or regularly transacts business in person; and
- (B) inspection of premises at the premises to be inspected.

(d) Protecting a Person Subject to a Subpoena; Enforcement.

(1) *Avoiding Undue Burden or Expense; Sanctions.* A party or attorney responsible for issuing and serving a subpoena must take reasonable steps to avoid imposing undue burden or expense on a person subject to the subpoena. The court for the district where compliance is required must enforce this duty and impose an appropriate sanction—which may include lost earnings and reasonable attorney's fees—on a party or attorney who fails to comply.

(2) *Command to Produce Materials or Permit Inspection.*

(A) *Appearance Not Required.* A person commanded to produce documents, electronically stored information, or tangible things, or to permit the inspection of premises, need not appear in person at the place of production or inspection unless also commanded to appear for a deposition, hearing, or trial.

(B) *Objections.* A person commanded to produce documents or tangible things or to permit inspection may serve on the party or attorney designated in the subpoena a written objection to inspecting, copying, testing, or sampling any or all of the materials or to inspecting the premises—or to producing electronically stored information in the form or forms requested. The objection must be served before the earlier of the time specified for compliance or 14 days after the subpoena is served. If an objection is made, the following rules apply:

- (i) At any time, on notice to the commanded person, the serving party may move the court for the district where compliance is required for an order compelling production or inspection.
- (ii) These acts may be required only as directed in the order, and the order must protect a person who is neither a party nor a party's officer from significant expense resulting from compliance.

(3) *Quashing or Modifying a Subpoena.*

(A) *When Required.* On timely motion, the court for the district where compliance is required must quash or modify a subpoena that:

- (i) fails to allow a reasonable time to comply;
 - (ii) requires a person to comply beyond the geographical limits specified in Rule 45(e);
 - (iii) requires disclosure of privileged or other protected matter, if no exception or waiver applies; or
 - (iv) subjects a person to undue burden.
- (B) *When Permitted.* To protect a person subject to or affected by a subpoena, the court for the district where compliance is required may, on motion, quash or modify the subpoena if it requires:

(i) disclosing a trade secret or other confidential research, development, or commercial information; or

(ii) disclosing an unretained expert's opinion or information that does not describe specific occurrences in dispute and results from the expert's study that was not requested by a party.

(C) *Specifying Conditions as an Alternative.* In the circumstances described in Rule 45(d)(3)(B), the court may, instead of quashing or modifying a subpoena, order appearance or production under specified conditions if the serving party:

- (i) shows a substantial need for the testimony or material that cannot be otherwise met without undue hardship; and
- (ii) ensures that the subpoenaed person will be reasonably compensated.

(e) Duties in Responding to a Subpoena.

(1) *Producing Documents or Electronically Stored Information.* These procedures apply to producing documents or electronically stored information:

(A) *Documents.* A person responding to a subpoena to produce documents must produce them as they are kept in the ordinary course of business or must organize and label them to correspond to the categories in the demand.

(B) *Form for Producing Electronically Stored Information Not Specified.* If a subpoena does not specify a form for producing electronically stored information, the person responding must produce it in a form or forms in which it is ordinarily maintained or in a reasonably usable form or forms.

(C) *Electronically Stored Information Produced in Only One Form.* The person responding need not produce the same electronically stored information in more than one form.

(D) *Inaccessible Electronically Stored Information.* The person responding need not provide discovery of electronically stored information from sources that the person identifies as not reasonably accessible because of undue burden or cost. On motion to compel discovery or for a protective order, the person responding must show that the information is not reasonably accessible because of undue burden or cost. If that showing is made, the court may nonetheless order discovery from such sources if the requesting party shows good cause, considering the limitations of Rule 26(b)(2)(C). The court may specify conditions for the discovery.

(2) *Claiming Privilege or Protection.*

(A) *Information Withheld.* A person withholding subpoenaed information under a claim that it is privileged or subject to protection as trial-preparation material must:

- (i) expressly make the claim; and
- (ii) describe the nature of the withheld documents, communications, or tangible things in a manner that, without revealing information itself privileged or protected, will enable the parties to assess the claim.

(B) *Information Produced.* If information produced in response to a subpoena is subject to a claim of privilege or of protection as trial-preparation material, the person making the claim may notify any party that received the information of the claim and the basis for it. After being notified, a party must promptly return, sequester, or destroy the specified information and any copies it has; must not use or disclose the information until the claim is resolved; must take reasonable steps to retrieve the information if the party disclosed it before being notified; and may promptly present the information under seal to the court for the district where compliance is required for a determination of the claim. The person who produced the information must preserve the information until the claim is resolved.

(g) *Contempt.*

The court for the district where compliance is required—and also, after a motion is transferred, the issuing court—may hold in contempt a person who, having been served, fails without adequate excuse to obey the subpoena or an order related to it.

Schedule A

1. The geographic extent of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site ("the Site").
2. The identity of parties that EPA has identified as potentially responsible parties ("PRPs") and has asked to participate in the cleanup of the Site.
3. The identity of parties that have participated in cleanup efforts at the Site to date.
4. The identity of parties that have refused to participate in cleanup efforts at the Site.
5. A general description of work performed at the Site to date.
6. EPA's reasons for concluding that the removal actions at the Plainwell Impoundment and Plainwell Dam No. 2 Impoundment that were directed by the 2007 Administrative Settlement Agreement and Order on Consent ("AOC") between EPA, Millennium Holdings, LLC and Georgia-Pacific, LLC and the 2009 AOC between EPA and Georgia-Pacific, LLC were time-critical.
7. EPA's present expectation regarding the need for future removal or remedial actions at the Site.
8. EPA's process for reviewing and approving deliverables submitted by PRPs pursuant to AOCs.
9. EPA's reasons for assuming responsibility as lead agency at the Site.
10. The source(s) of PCBs at the Site.
11. The PCBs that predominate at the Site and that necessitate past and future cleanup activities.
12. Estimates of total PCBs in the River, both before the clean-up and currently, and their locations.





**IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION**

**GEORGIA-PACIFIC CONSUMER
PRODUCTS LP,
FORT JAMES CORPORATION, and
GEORGIA-PACIFIC LLC**

Plaintiffs,

v.

**NCR CORPORATION,
INTERNATIONAL PAPER CO.,
and WEYERHAEUSER CO.,**

Defendants.

No: 1:11-cv-00483

Judge Robert J. Jonker

**JOINT STIPULATION ON GEORGIA PACIFIC'S MOTION TO COMPEL THE
DEPOSITION OF THE UNITED STATES ENVIRONMENTAL PROTECTION
AGENCY**

Non-party United States of America and Plaintiffs Georgia Pacific Consumer Products, LP, Fort James Corporation, and Georgia-Pacific LLC (“Georgia Pacific”) hereby stipulate to the deposition of the U.S. Environmental Protection Agency (“EPA”) and for the withdrawal of Georgia Pacific’s motion to compel the deposition of EPA, and state as follows:

1. On October 17, 2014, Georgia Pacific issued a subpoena for the deposition of EPA pursuant to Fed. R. Civ. P. 30(b)(6). The subpoena identified twelve topics on which Georgia Pacific sought information from EPA concerning the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. On October 31, 2014, EPA objected to the subpoena by letter, invoking its regulations at 40 C.F.R. 2.401 *et seq.*, and declined to produce a witness in response to the subpoena. (ECF No. 654-5).

2. On November 14, 2014, Georgia Pacific moved to compel the deposition of EPA (ECF No. 654). The United States appeared in this action as a non-party and filed its response on December 9, 2014 (ECF Nos. 667, 687, 688).

3. On January 9, 2015, the Court held oral argument on Georgia Pacific's motion to compel. (ECF No. 700). During argument, Georgia Pacific withdrew topics 1 through 5 of its deposition subpoena and provided additional information supporting its request for discovery from EPA on topics 6 through 12.

4. In light of Georgia Pacific's narrowing of deposition topics and the additional information provided during the January 9, 2015 argument, the United States agrees that it will make a good faith effort to prepare a representative of EPA on topics 6 through 12 of the deposition subpoena, subject to and without waiving the objections stated in its October 31, 2014 letter. The United States further agrees that it will make the representative of EPA available on a date and at a location convenient for the witness, counsel for the United States, and the parties in this action.

WHEREFORE, Georgia Pacific hereby withdraws its motion to compel the deposition of EPA, and the United States and Georgia Pacific agree and stipulate that the United States will produce a representative of EPA on topics 6 through 12 of the deposition subpoena as stated above.

Respectfully submitted,

Counsel for Non-Party United States of America

s/Andrew C. Hanson

Andrew C. Hanson

Trial Attorney

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s/Michael Randolph Shebelskie

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(804) 788-8200

Email: mshebelskie@hunton.com

CERTIFICATE OF SERVICE

I hereby certify that on January 16, 2015, I served the foregoing using the CM/ECF system which will cause an electronic copy to be served on counsel of record authorized to receive such CM/ECF system filings.

s/Andrew C. Hanson
Andrew C. Hanson



UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:
Allied Paper/Portage Creek/Kalamazoo
River Superfund Site
Allegan and Kalamazoo Counties, Michigan

Millennium Holdings, LLC, and Georgia-
Pacific, LLC,

Respondents

ADMINISTRATIVE SETTLEMENT
AGREEMENT AND ORDER ON
CONSENT FOR REMEDIAL
INVESTIGATION/FEASIBILITY STUDY

U.S. EPA Region 5 V-W-07-C-864
CERCLA Docket No.

Proceeding Under Sections 104, 107, and
122 of the Comprehensive Environmental
Response, Compensation, and Liability Act,
as amended, 42 U.S.C. §§ 9604, 9607 and
9622.

EXHIBIT

#5720

10/14/14

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ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT
FOR SUPPLEMENTAL REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES

I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("U.S. EPA") and Millennium Holdings, LLC and Georgia-Pacific, LLC, ("Respondents"). The Settlement Agreement concerns the preparation and performance of Supplemental Remedial Investigations and Feasibility Studies ("SRI/FSs") at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site ("Site") located in the Allegan and Kalamazoo Counties of Michigan, and the reimbursement for future response costs incurred by U.S. EPA in connection with the SRI/FSs.

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 107, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §§ 9604, 9607, and 9622 ("CERCLA"). This authority was delegated to the Administrator of U.S. EPA on January 23, 1987, by Executive Order 12580, 52 Fed. Reg. 2926 (Jan. 29, 1987), and further delegated to Regional Administrators on May 11, 1994, by U.S. EPA Delegation Nos. 14-14-C and 14-14-D. This authority was further re-delegated by the Regional Administrator, U.S. EPA, Region 5, to the Director, Superfund Division, U.S. EPA, Region 5, by U.S. EPA Delegation Nos. 14-14-C and 14-14-D on May 2, 1996.

3. In accordance with Section 104(b)(2) and Section 122(j)(1) of CERCLA, 42 U.S.C. §§ 9604(b)(2) and 9622(j)(1), U.S. EPA notified the Michigan Department of Environmental Quality ("MDEQ"), the Michigan Department of Natural Resources ("MDNR"), the Michigan Attorney General, the United States Department of the Interior ("DOI"), and the National Oceanic and Atmospheric Administration ("NOAA") of negotiations with potentially responsible parties regarding the release of hazardous substances that may have resulted in injury to the natural resources under federal and state trusteeship. In accordance with Section 121(f)(1)(F), U.S. EPA has notified the State of Michigan (the "State") of negotiations with potentially responsible parties regarding the implementation of the RI and FS for the Site.

4. U.S. EPA and Respondents recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondents in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondents do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of fact, conclusions of law, and determinations in Sections V and VI of this Settlement Agreement. Respondents agree to comply with and be bound by the terms of this Settlement Agreement and further agree that they will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA and upon Respondents and their agents, successors, and assigns. Any change in ownership or corporate status of a Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter such Respondent's responsibilities under this Settlement Agreement.

6. Respondents are jointly and severally liable for carrying out all activities required under this Settlement Agreement. In the event of the insolvency or other failure of any one or more Respondents to implement the requirements of this Settlement Agreement, the remaining Respondents shall complete all such requirements.

7. Respondents shall ensure that their contractors, subcontractors, and representatives receive a copy of this Settlement Agreement and comply with this Settlement Agreement. Respondents shall be responsible for any noncompliance with this Settlement Agreement.

8. Each undersigned representative of Respondents certifies that he or she is fully authorized to enter into the terms and conditions of this Settlement Agreement and to execute and legally bind the Respondents to this Settlement Agreement.

III. STATEMENT OF PURPOSE

9. In entering into this Settlement Agreement, the objectives of U.S. EPA and Respondents are: (a) to supplement existing information in determining the nature and extent of contamination and any current or potential threat to the public health, welfare, or the environment posed by the release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site and to collect sufficient additional data, for developing and evaluating effective remedial alternatives by conducting Supplemental Remedial Investigations ("SRI(s)") for Areas of the Site, identified in the Statement of Work ("SOW") attached as Attachment A to this Settlement Agreement; (b) to identify and evaluate remedial alternatives that protect human health and the environment by preventing, eliminating, reducing, or controlling any release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site, by conducting Feasibility Studies ("FS(s)") for Areas of the Site, as more specifically set forth in the Statement of Work ("SOW") in Attachment A to this Settlement Agreement; and (c) to recover response and oversight costs incurred by U.S. EPA with respect to this Settlement Agreement.

10. The Work conducted under this Settlement Agreement is subject to approval by U.S. EPA and shall provide all appropriate and necessary supplemental information to assess Area conditions and evaluate alternatives to the extent necessary to select a remedy that will be consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 ("NCP"). Respondents shall conduct all Work under this Settlement Agreement in compliance with CERCLA, the NCP, and all applicable U.S. EPA guidances, policies, and procedures.

IV. DEFINITIONS

11. Unless otherwise expressly provided herein, terms used in this Settlement Agreement, which are defined in CERCLA or in regulations promulgated under CERCLA, shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

- a. "ARARs" mean all applicable local, state, and federal laws and regulations, and all "applicable requirements" or "relevant and appropriate requirements" as defined at 40 C.F.R. § 300.5 and 42 U.S.C. § 9621(d).
- b. "Area" and "Area of the Site" shall mean those portions of the Site identified in the SOW (Attachment A) where SRI/FS work is to be performed.
- c. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, *et seq.*
- d. "Day" shall mean a calendar day. In computing any period of time under this Settlement Agreement, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.
- e. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXIX.
- f. "EPA" or "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.
- g. "MDEQ" shall mean the Michigan Department of Environmental Quality and any successor departments or agencies of the State.
- h. "Engineering Controls" shall mean constructed containment barriers or systems that control one of the following: downward migration, infiltration or seepage of surface runoff or rain; or natural leaching migration of contaminants through the subsurface over time. Examples include caps, engineered bottom barriers, immobilization processes, and vertical barriers.
- i. "Future Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States incurs in reviewing or developing plans, reports, technical memoranda and other items pursuant to this Settlement Agreement, conducting community relations, providing technical assistance grants to community groups (if any), verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement, including but not limited to, payroll costs, contractor costs (including fees), travel costs,

laboratory costs, ATSDR costs, the costs incurred pursuant to Paragraph 55 and 57 (costs and attorneys fees and any monies paid to secure access, including the amount of just compensation), and Paragraph 41 (emergency response).

- j. "Institutional controls" shall mean non-engineered instruments, such as administrative and/or legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land and/or resource use. Examples of institutional controls include easements and restrictive covenants, zoning restrictions, special building permit requirements, and well drilling prohibitions.
- k. "Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.
- l. "NCP" or "National Contingency Plan" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.
- m. "Paragraph" shall mean a portion of this Settlement Agreement identified by an Arabic numeral. References to paragraphs in the SOW will be so identified, for example, as "SOW Paragraph 15."
- n. "Parties" shall mean U.S. EPA and Respondents.
- o. "RCRA" shall mean the Resource Conservation and Recovery Act, also known as the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.*
- p. "Respondents" shall mean Millennium Holdings, LLC and Georgia-Pacific, LLC.
- q. "RI/FS Planning Documents" shall mean the Work Plan/Field Sampling Plan, Quality Assurance Project Plan, Health and Safety Plan and other documents referenced in the SOW (Attachment A).
- r. "Section" shall mean a portion of this Settlement Agreement identified by a Roman numeral. References to sections in the SOW will be so identified, for example, as "SOW Section V."
- s. "Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent, the SOW, all appendices attached hereto (listed in Section XXVII) and all documents incorporated by reference into this document including without limitation U.S. EPA-approved submissions. U.S. EPA-approved

submissions (other than progress reports) are incorporated into and become a part of the Settlement Agreement upon approval by U.S. EPA. In the event of conflict between this Settlement Agreement and any appendix, this Settlement Agreement shall control.

- t. "Site" shall mean the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, located in Allegan and Kalamazoo Counties, Michigan, as depicted generally on the map attached as Attachment B.
- u. "State" shall mean the State of Michigan.
- v. "Statement of Work" or "SOW" shall mean the Statement of Work for development of SRI/FSs for Areas of the Site as set forth in Attachment A to this Settlement Agreement. The Statement of Work is incorporated into this Settlement Agreement and is an enforceable part of this Settlement Agreement as are any modifications made thereto in accordance with this Settlement Agreement.
- w. "Waste Material" shall mean (1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); (3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and (4) any "hazardous material" under Part 201, Environmental Remediation, of the Michigan Natural Resources and Environmental Protection Act.
- x. "Work" shall mean all activities Respondents are required to perform under this Settlement Agreement, except those required by Section XIV (Retention of Records).
- y. "Work Plan" shall mean the U.S. EPA-approved Work Plan for the collection of supplemental remedial investigation data in the first 21.9-mile stretch of the Site from Morrow Dam to the Plainwell Dam, including a 3-mile stretch of Portage Creek, which is attached as Attachment C to this Settlement Agreement.

V. U.S. EPA'S FINDINGS OF FACT

12. The Site is located in the Allegan and Kalamazoo Counties of Michigan and includes approximately 80 miles of the Kalamazoo River (from Morrow Lake Dam to Lake Michigan), including the river banks and formerly impounded floodplains, as well as a 3-mile stretch of Portage Creek and four paper residual disposal areas. Hazardous substances, pollutants, or contaminants have or may have come to be located at the Site from former paper mills or other former industry operations located along the Kalamazoo River. Within the Site several operable units ("OUs") have been identified for response action to date, including: the Allied Paper, Inc. Landfill (OU1); the Willow Boulevard/A-Site Landfill (OU2); the King Highway Landfill (OU3); the 12th Street Landfill (OU4); and 80 miles of the Kalamazoo River, including a 3-mile

stretch of Portage Creek (OU5). Additionally, former paper mill properties have been identified as potential sources of PCBs to the Site.

13. The Kalamazoo River corridor contains a mix of industry, ranging from paper product production to pharmaceuticals to automobile parts manufacturing. Industries and municipalities have historically used the river for discharging wastes. These wastes contain polychlorinated biphenyls ("PCBs"), volatile organic compounds ("VOCs"), semi-volatile organic compounds ("SVOCs"), metals, and pesticides, which were detected in river sediment and floodplain soil samples. The wastes contain a number of known and suspected carcinogens and other potentially hazardous substances or pollutants or contaminants.

14. The sediments, water column, and biota in the Kalamazoo River are contaminated with PCBs and other chemicals. A portion of the Kalamazoo River has been identified as an Area of Concern by the International Joint Commission because of the River's detrimental impact on Lake Michigan due to the PCB contamination.

15. Several endangered and threatened plant and animal species inhabit the Site. These species include turtles, bald eagles, a snake species, and various plants. The Michigan Department of Public Health has issued fish consumption advisories for the Kalamazoo River annually since 1977.

16. The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site was listed on the National Priorities List ("NPL") by publication in the Federal Register, 55 Fed. Reg. 35502 pursuant to CERCLA Section 105, 42 U.S.C. § 9605, on August 30, 1990. The Site was designated a non-Fund financed, state enforcement lead site for purposes of the RI/FS. U.S. EPA assumed the enforcement lead for various operable units of the Site, including the Kalamazoo River OU5, on February 2, 2002.

17. The Respondents are Millennium Holdings, LLC and Georgia-Pacific, LLC, owners and operators of portions of the Site at the time of disposal.

18. The following response actions have been taken at the Site:

- Pursuant to an agreement with the State, a group of potentially responsible parties ("PRPs") for the Site, members of the Kalamazoo River Study Group ("KRSRG"), conducted an RI/FS for a portion of the Site from Morrow Dam to Lake Allegan Dam. The KRSRG released the results of its RI/FS to U.S. EPA and the MDEQ in October 2000. MDEQ determined the RI/FS to be deficient; and therefore, in July 2002 the RI/FS was formally rejected by the MDEQ. Since that time, significant additional data have been collected by U.S. EPA, MDEQ and the Respondents. Exhibit C is a partial listing of the existing data that will be reviewed by U.S. EPA to ensure data usability and considered by both U.S. EPA and Respondents.

- Approximately 150,000 cubic yards (cy) of PCB-containing residuals and sediments were excavated from the former Bryant Mill Pond in 1998 and 1999 and disposed of at OU1.
- Approximately 5,000 cy of soils/residuals were excavated from the King Street Storm Sewer in June 1999 and disposed of at OU3, after which the area was backfilled, graded, revegetated, and stabilized with 550 feet of riprap.
- 11,000 cy were excavated from the former King Mill in the fall of 1999 and disposed of at OU3, after which the area was backfilled, graded, and revegetated.
- The storm water sewers were cleared at the Plainwell, Inc. Mill in December 1995 and October 1996.
- Response actions were taken at OU1, including: stabilization of disposal area berms along Portage Creek; removal and disposal of PCB-containing residuals and sediments and construction of a landfill cap over former residuals dewatering lagoons occupying approximately 22 acres of the site; extraction and treatment of surface water; and implementation of an erosion control plan.
- Approximately 12,000 cy of PCB-containing sediments were consolidated at OU3, the King Highway Landfill, in the fall of 1999, after which the area was backfilled, revegetated, and stabilized with 700 feet of riprap. The 23-acre King Highway Landfill was capped and closed in 2000.
- In 1998 and 1999, interim response actions were taken at OU2. A sheetpile was installed at OU2 to stabilize the berm that separates the A-Site from the Kalamazoo River. Approximately 7,000 cy of PCB-containing sediments were excavated along the western bank of the Willow Boulevard Landfill and from the Former Olmstead Creek confluence with the Kalamazoo River and were consolidated on-site. The Willow Boulevard Landfill was then graded and temporarily capped with a 6-inch thick sand layer and a geotextile cover. A final Remedial Investigation/Focused Feasibility Study was completed in December 2004 for OU2, and in September 2006, a record of decision ("ROD") was signed for OU2.
- A final Remedial Investigation/Feasibility Study was completed in July 1997 for OU4, and the decision by the MDEQ on the remedial action to be implemented at OU4 was embodied in a final ROD, executed on September 28, 2001. U.S. EPA concurred with the remedy selected by the MDEQ. A Consent Decree between U.S. EPA and Weyerhaeuser Company (Weyerhaeuser) was lodged in District Court on February 22, 2005, under which Weyerhaeuser agreed to construct a cap for OU4 and perform additional RI/FS work at OU7. Weyerhaeuser also agreed to deposit \$6.2 million plus interest into a special account that will be used solely to conduct or finance response actions at OUS.

- Approximately 38,000 cy of PCB-containing residuals were excavated from the Georgia-Pacific, LLC Kalamazoo Mill Lagoons at OU6 between November 1998 and September 1999 and disposed of at OU3. The area was then backfilled, graded, revegetated, and stabilized with 400 feet of riprap.
- In 2005, U.S. EPA and the former Plainwell Mill property owners negotiated a settlement for \$6.2 million.

VI. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the Findings of Fact set forth above, and the Administrative Record in this matter, U.S. EPA has determined that:

19. The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site is a "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

20. The contamination found at the Site, as identified in the Findings of Fact above, includes "hazardous substances" as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), or constitutes "any pollutant or contaminant" that may present an imminent and substantial danger to public health or welfare under Section 104(a)(1) of CERCLA.

21. The conditions described in Paragraph 13 of the Findings of Fact, above, constitute an actual and/or threatened "release" of a hazardous substance from the facility as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

22. Each Respondent is a "person" as defined in Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

23. Respondents are responsible parties under Sections 104, 107 and 122 of CERCLA, 42 U.S.C. §§ 9604, 9607 and 9622.

24. The actions required by this Settlement Agreement are necessary to protect the public health, welfare or the environment, are in the public interest, 42 U.S.C. § 9622(a), are consistent with CERCLA and the NCP, 42 U.S.C. §§ 9604(a)(1), 9622(a), and will expedite effective remedial action and minimize litigation, 42 U.S.C. § 9622(a).

25. U.S. EPA has determined that Respondents are qualified to conduct the RI/FS within the meaning of Section 104(a) of CERCLA, 42 U.S.C. § 9604(a), and will carry out the Work properly and promptly, in accordance with Sections 104(a) and 122(a) of CERCLA, 42 U.S.C. §§ 9604(a) and 9622(a), if Respondents comply with the terms of this Settlement Agreement.

VII. SETTLEMENT AGREEMENT AND ORDER

26. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondents shall

comply with all provisions of this Settlement Agreement including, but not limited to, all attachments to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VIII. DESIGNATION OF CONTRACTORS AND PROJECT COORDINATORS

27. Selection of Contractors. Personnel

a. All Work performed under this Settlement Agreement shall be under the direction and supervision of qualified personnel. Within 30 days of the Effective Date of this Settlement Agreement, and before the Work outlined below begins, Respondents shall notify U.S. EPA in writing of the names, titles, and qualifications of the personnel, including contractors, subcontractors, consultants, and laboratories to be used in carrying out such Work. With respect to any proposed contractor, Respondents shall demonstrate that the proposed contractor has a quality system which complies with ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*. (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared in accordance with EPA Requirements for Quality Management Plans (QA/R-2), (EPA/240/B-01/002, March 2001) or equivalent documentation as determined by U.S. EPA. The qualifications of the persons undertaking the Work for Respondents shall be subject to U.S. EPA's review, for verification that such persons meet minimum technical background and experience requirements. If Respondents fail to demonstrate to U.S. EPA's satisfaction that Respondents are qualified to perform properly and promptly the actions set forth in this Settlement Agreement, U.S. EPA may take over the Work required by this Settlement Agreement.

b. If U.S. EPA disapproves in writing of any person(s)' technical qualifications, Respondents shall notify U.S. EPA of the identity and qualifications of the replacement(s) within 30 days of the written notice. If U.S. EPA subsequently disapproves of the replacement(s), U.S. EPA reserves the right to terminate this Settlement Agreement and to conduct complete SRI/FSSs, and to seek reimbursement for costs and penalties from Respondents. During the course of the SRI/FSSs, Respondents shall notify U.S. EPA in writing of any changes or additions in the personnel used to carry out such Work, providing their names, titles, and qualifications. U.S. EPA shall have the same right to disapprove changes and additions to personnel as it has hereunder regarding the initial notification.

28. Within fifteen (15) days after the Effective Date, Respondents shall designate a Project Coordinator who shall be responsible for administration of all actions by Respondents required by this Settlement Agreement and shall submit to U.S. EPA the designated Project Coordinator's name, address, telephone number, and qualifications. To the greatest extent possible, the Project Coordinator shall be present on-site or readily available during any Area Work. U.S. EPA retains the right to disapprove of the designated Project Coordinator. If U.S. EPA disapproves of the designated Project Coordinator, Respondents shall retain a different Project Coordinator and shall notify U.S. EPA of that person's name, address, telephone number, and qualifications within fifteen (15) days following U.S. EPA's disapproval. Respondents shall have the right to

change their Project Coordinator subject to U.S. EPA's right to disapprove. Respondents shall notify U.S. EPA fifteen (15) days before such change is made. The initial notification may be made orally, but shall be promptly followed by a written notification.

29. U.S. EPA has designated Shari Kolak of the Superfund Division, Region 5, as its Project Coordinator. U.S. EPA will notify Respondents of a change in its designation of the Project Coordinator. Except as otherwise provided in this Settlement Agreement, Respondents shall direct all submissions required by this Settlement Agreement to:

Shari Kolak, RPM
Remedial Project Manager
U.S. EPA, Superfund Division
77 West Jackson Blvd., SR-6J
Chicago, Illinois 60604-3590

Respondents are encouraged to make their submissions to U.S. EPA on recycled paper (which includes significant post-consumer waste paper content where possible) and using two-sided copies. Respondents shall make submissions electronically according to U.S. EPA Region 5 specifications. Receipt by Respondents' Project Coordinator of any notice or communication from U.S. EPA relating to this Settlement Agreement shall constitute receipt by Respondents. Documents to be submitted to the Respondents shall be sent to:

Michael J. Erickson, P.E.
Arcadis U.S. Inc.
10559 Citation Drive
Suite 100
Brighton, MI 48116

30. U.S. EPA's Project Coordinator shall have the authority lawfully vested in a Remedial Project Manager ("RPM") and On-Scene Coordinator ("OSC") by the NCP. In addition, U.S. EPA's Project Coordinator shall have the authority consistent with the NCP to halt any Work required by this Settlement Agreement, and to take any necessary response action when s/he determines that conditions at the Site may present an immediate endangerment to public health or welfare or the environment. The absence of the U.S. EPA Project Coordinator from the Area under study pursuant to this Settlement Agreement shall not be cause for the stoppage or delay of Work.

31. U.S. EPA and Respondents shall have the right, subject to Paragraph 27, to change their respective Project Coordinator. Respondents shall notify U.S. EPA fifteen (15) days before such a change is made. The initial notification by either party may be made orally, but shall be promptly followed by a written notice.

32. U.S. EPA shall arrange for a qualified person to assist in its oversight and review of the conduct of the SRI/FSS, as required by Section 104(a) of CERCLA, 42 U.S.C. § 9604(a). Such

person shall have the authority to observe Work and make inquiries in the absence of U.S. EPA, but not to modify the SRI/FS Planning Documents or other work plans.

IX. WORK TO BE PERFORMED

33. a. Respondents shall conduct SRI/FSs for Areas of the Site in accordance with the provisions of this Settlement Agreement, the SOW, the Work Plan, CERCLA, the NCP, U.S. EPA guidance related to remedial investigations and feasibility studies including, but not limited to, the *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (OSWER Directive # 9355.3-01; EPA/540/G-89/004, October, 1988), *Guidance for Data Usability in Risk Assessment* (OSWER Directive #9285.7-05), *Risk Assessment Guidance for Superfund (RAGS), Volume 1 - Human Health Evaluation Manual (Part A), Interim Final* (EPA/540/1-89/002), OSWER Directive 9285.7-01A, December 1, 1989; and *Risk Assessment Guidance for Superfund (RAGS), Volume 1 - Human Health Evaluation Manual (Part D. Standardized Planning, Reporting, and Review of Superfund Risk Assessments)*, Interim, (EPA 540/R-97/033), OSWER Directive 9285.7-01D, January 1998, guidance referenced in the SOW, and any R/FS related guidance subsequently issued by U.S. EPA.

b. Respondents shall submit SRI and FS reports in accordance with the terms of the attached SOW. In the SRI and FS Reports, Respondents shall address the factors required to be taken into account in Section 121 of CERCLA, 42 U.S.C. § 9621, and Section 300.430 of the NCP, 40 C.F.R. § 300.430. The SRIs shall characterize the geology and hydrogeology of the Areas, determine the nature and extent of hazardous substances, pollutants or contaminants at or from Areas, and characterize all ecological zones including terrestrial, riparian, wetlands, aquatic/marine, and transitional. Respondents shall prepare, for inclusion with the Area-Specific SRI Reports, a determination of the nature and extent of the current and potential threat to the public health or welfare or the environment posed by the release or threatened release of any hazardous substances, pollutants, or contaminants at or from an Area of the Site, including use of the "Baseline Human Health Risk Assessment" and the results of the peer-reviewed "Baseline Ecological Risk Assessment." In the FS Reports, Respondents shall determine and evaluate (based on treatability testing, where appropriate) alternatives for remedial action that protect human health and the environment by recycling waste or by eliminating, reducing and/or controlling risks posed through each pathway at the Areas. In the FS Reports, the Respondents shall evaluate a range of alternatives including, but not limited to, those alternatives described in 40 C.F.R. § 300.430(e) and remedial alternatives that utilize permanent solutions and alternative treatment technologies or resource recovery technologies, recognizing the dynamics of a river system. The FS Reports shall include a detailed analysis of individual alternatives against each of the nine evaluation criteria in 40 C.F.R. § 300.430(c)(9)(iii) and a comparative analysis that focuses upon the relative performance of each alternative against the nine criteria in 40 C.F.R. § 300.430(c)(9)(iii). Respondents shall submit to U.S. EPA and the State the requested number of copies of all plans, reports, submittals and other deliverables required under this Settlement Agreement, the SOW, and the SRI/FS Planning Documents in accordance with the approved schedule for review and approval pursuant to Section X (U.S. EPA Approval of Plans and Other Submissions). Upon request by U.S. EPA, Respondents shall submit in electronic form all portions of SRI and FS Reports, any report or other deliverable Respondents are required to

submit pursuant to provisions of this Settlement Agreement, including the SOW. Upon approval by U.S. EPA, all deliverables under this Settlement Agreement, including the SOW, shall be incorporated into and become enforceable under this Settlement Agreement.

34. Modification of any plans

a. If at any time during the SRI/FS process, Respondents identify a need for additional data, Respondents shall submit a memorandum documenting the need for additional data to the U.S. EPA Project Coordinator within thirty days (30) of identification. U.S. EPA in its discretion will determine whether the additional data will be collected by Respondents and whether it will be incorporated into reports and deliverables.

b. In the event of unanticipated or changed circumstances at any Area of the Site, Respondents shall notify the U.S. EPA Project Coordinator by telephone within 24 hours of discovery of the unanticipated or changed circumstances. In addition to the authorities in the NCP, in the event that U.S. EPA determines that the immediate threat or the unanticipated or changed circumstances warrant changes in the SRI/FS Planning Documents, U.S. EPA shall modify or amend the SRI/FS Planning Documents in writing accordingly. Respondents shall perform the SRI/FS Planning Documents as modified or amended.

c. U.S. EPA may determine that in addition to tasks defined in the initially approved SRI/FS Planning Documents, other additional Work may be necessary to accomplish the objectives of the SRI/FSs as set forth in the SOW. U.S. EPA may require that Respondents perform these response actions in addition to those required by the initially approved SRI/FS Planning Documents, including any approved modifications, if it determines that such actions are necessary for a complete SRI/FS.

d. Respondents shall confirm their willingness to perform the additional Work in writing to U.S. EPA within 7 days of receipt of the U.S. EPA request. If Respondents object to any modification determined by U.S. EPA to be necessary pursuant to this Paragraph, Respondents may seek dispute resolution pursuant to Section XV (Dispute Resolution). The SOW and/or SRI/FS Planning Documents shall be modified in accordance with the final resolution of the dispute.

e. Respondents shall complete the additional Work according to the standards, specifications, and schedule set forth or approved by U.S. EPA in a written modification to the SRI/FS Planning Documents or written work plan supplement. U.S. EPA reserves the right to conduct the Work itself at any point, to seek reimbursement from Respondents, and/or to seek any other appropriate relief.

f. Nothing in this Paragraph shall be construed to limit U.S. EPA's authority to require performance of further response actions as otherwise provided in this Settlement Agreement.

35. Off-Site Shipment of Waste Material

a. Respondents shall, prior to any off-site shipment of Waste Material from any Area of the Site to an out-of-state waste management facility, provide written notification of such shipment of Waste Material to the appropriate state environmental official in the receiving facility's state and to U.S. EPA's Designated Project Coordinator. However, this notification requirement shall not apply to any off-site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

b. Respondents shall include in the written notification the following information: (1) the name and location of the facility to which the Waste Material is to be shipped; (2) the type and quantity of the Waste Material to be shipped; (3) the expected schedule for the shipment of the Waste Material; and (4) the method of transportation. Respondents shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

c. The identity of the receiving facility and state will be determined by Respondents following the award of the contract for the supplemental remedial investigation and feasibility study. Respondents shall provide the information required by Subparagraph 38.b and 38.d as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

d. Before shipping any hazardous substances, pollutants, or contaminants from any Area of the Site to an off-site location, Respondents shall obtain U.S. EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents shall only send hazardous substances, pollutants, or contaminants from any Area of the Site to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

36. Meetings. Respondents shall make presentations at, and participate in, meetings at the request of U.S. EPA during the initiation, conduct, and completion of the SRI/FSs. In addition to discussion of the technical aspects of the SRI/FSs, topics will include anticipated problems or new issues. Meetings will be scheduled at U.S. EPA's discretion.

37. Progress Reports. In addition to the deliverables set forth in this Settlement Agreement, Respondents shall provide to U.S. EPA monthly progress reports by the 15th day of the following month. At a minimum, with respect to the preceding month, these progress reports shall: (1) describe the actions which have been taken to comply with this Settlement Agreement during that month, (2) include hard copies and electronic copies (according to U.S. EPA Region 5 specifications) of all results of sampling and tests and all other data received by the Respondents (3) describe Work planned for the next two months with schedules relating such Work to the overall project schedule for each SRI/FS completion, and (4) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

38. Emergency Response and Notification of Releases

a. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from any Area of the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action. Respondents shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondents shall also immediately notify the U.S. EPA Project Coordinator or, in the event of his/her unavailability, the On Scene Coordinator ("OSC") or the Regional Duty Officer, U.S. EPA Region 5 Emergency Planning and Response Branch at (Tel: (312) 353-2318) of the incident or Site conditions. In the event that Respondents fail to take appropriate response action as required by this Paragraph, and U.S. EPA takes such action instead, Respondents shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to Section XVIII (Payment of Response Costs).

b. In addition, in the event of any release of a hazardous substance from the Site, Respondents shall immediately notify the U.S. EPA Project Coordinator, the OSC, or Regional Duty Officer at (312) 353-2318 and the National Response Center at (800) 424-8802. Respondents shall submit a written report to U.S. EPA within 7 days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

X. U.S. EPA APPROVAL OF PLANS AND OTHER SUBMISSIONS

39. After review of any plan, report or other item that is required to be submitted for approval pursuant to this Settlement Agreement, including the SOW, U.S. EPA shall: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that Respondents modify the submission; or (e) any combination of the above. However, U.S. EPA shall not modify a submission without first providing Respondents at least one notice of deficiency and an opportunity to cure in accordance with the schedule in the SOW, except where to do so would cause serious disruption to the Work or where previous submission(s) have been disapproved due to material defects.

40. In the event of approval, approval upon conditions, or modification by U.S. EPA, pursuant to Subparagraph 42(a), (b), (c) or (e), Respondents shall proceed to take any action required by the plan, report or other item, as approved or modified by U.S. EPA subject only to their right to invoke the Dispute Resolution procedures set forth in Section XV (Dispute Resolution) with respect to the modifications or conditions made by U.S. EPA. Following U.S. EPA approval or modification of a submittal or portion thereof, Respondents shall not thereafter

alter or amend such submittal or portion thereof unless directed by U.S. EPA. In the event that U.S. EPA modifies the submission to cure the deficiencies pursuant to Subparagraph 42(c) and the submission had a material defect, U.S. EPA retains the right to seek stipulated penalties, as provided in Section XVI (Stipulated Penalties). U.S. EPA also retains the right to perform its own studies, complete the SRI/FSs (or any portion of the SRI/FSs), and seek reimbursement from Respondents for its costs; and/or seek any other appropriate relief.

41. Resubmission of Plans

a. Upon receipt of a notice of disapproval, Respondents shall, in accordance with the schedule in the SOW or such longer time as specified by U.S. EPA in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Any stipulated penalties applicable to the submission, as provided in Section XVI, shall accrue during the thirty-day (30) period or otherwise specified period but shall not be payable unless the resubmission is disapproved or modified due to a material defect as provided in Paragraphs 41 and 42.

b. Notwithstanding the receipt of a notice of disapproval, Respondents shall proceed to take any action required by any non-deficient portion of the submission unless otherwise directed by U.S. EPA. Implementation of any non-deficient portion of a submission shall not relieve Respondents of any liability for stipulated penalties under Section XVI (Stipulated Penalties).

c. For each Area of the Site where Respondents are conducting SRI/FS activities, unless otherwise directed by U.S. EPA, Respondents shall not proceed further with any subsequent activities or tasks until receiving U.S. EPA approval for the following deliverables: Area-specific SRI/FS Work Plans/Field Sampling Plans, Quality Assurance Project Plans, Draft SRI Reports, Treatability Testing Work Plans, and Sampling and Analysis Plans, and Draft Feasibility Study Reports. While awaiting U.S. EPA approval on these deliverables, Respondents shall proceed with all other tasks and activities which may be conducted independently of these deliverables, in accordance with the schedule set forth in this Settlement Agreement.

d. For all remaining deliverables not enumerated above in Subparagraph 40.c., Respondents shall proceed with all subsequent tasks, activities and deliverables without awaiting U.S. EPA approval on the submitted deliverable. U.S. EPA reserves the right to stop Respondents from proceeding further, either temporarily or permanently, on any task, activity, or deliverable at any point during the SRI/FS process.

42. If U.S. EPA disapproves a resubmitted plan, report or other item, or portion thereof, U.S. EPA may direct Respondents to correct the deficiencies. U.S. EPA also retains the right to modify or develop the plan, report, or other item. Respondents shall implement any such plan, report, or item as corrected, modified or developed by U.S. EPA, subject only to their right to invoke the procedures set forth in Section XV (Dispute Resolution).

43. If upon resubmission, a plan, report, or item is disapproved or modified by U.S. EPA due to a material defect, Respondents shall be deemed to have failed to submit such plan, report, or item timely and adequately unless Respondents invoke the dispute resolution procedures in accordance with Section XV (Dispute Resolution) and U.S. EPA's action is revoked or substantially modified pursuant to a Dispute Resolution decision issued by U.S. EPA or superseded by an agreement reached pursuant to that Section. The provisions of Section XV (Dispute Resolution) and Section XVI (Stipulated Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If U.S. EPA's disapproval or modification is not otherwise revoked, substantially modified or superseded as a result of a decision or agreement reached pursuant to the Dispute Resolution process set forth in Section XV, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section XVI.

44. In the event that U.S. EPA takes over some of the tasks, but not the preparation of the SRI Reports or the FS Reports, Respondents shall incorporate and integrate information supplied by U.S. EPA into the final reports.

45. All plans, reports, and other items submitted to U.S. EPA under this Settlement Agreement shall, upon approval or modification by U.S. EPA, be incorporated into and enforceable under this Settlement Agreement. In the event U.S. EPA approves or modifies a portion of a plan, report, or other item submitted to U.S. EPA under this Settlement Agreement, the approved or modified portion shall be incorporated into and enforceable under this Settlement Agreement.

46. Neither failure of U.S. EPA to expressly approve or disapprove of Respondents' submissions within a specified time period, nor the absence of comments, shall be construed as approval by U.S. EPA. Whether or not U.S. EPA gives express approval for Respondents' deliverables, Respondents are responsible for preparing deliverables acceptable to U.S. EPA.

XI. QUALITY ASSURANCE, SAMPLING, AND DATA AVAILABILITY

47. Quality Assurance. Respondents shall assure that Work performed, samples taken and analyses conducted conform to the requirements of the SOW, the approved Multi-Area QAPP, the approved Area-specific Work Plan, and guidance identified therein. Respondents will assure that field personnel used by Respondents are properly trained in the use of field equipment and in chain of custody procedures. Respondents shall only use laboratories which have a documented quality system that complies with ANSI/ASQC E-4 1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*, (American National Standard, January 5, 1995) and *EPA Requirements for Quality Management Plans (QA/R-2)* (EPA/240/B-01/002, March 2001) or equivalent documentation as determined by U.S. EPA.

48. Sampling

a. All validated results of sampling, tests, modeling, or other data generated by Respondents, or on Respondents' behalf, during the period that this Settlement Agreement is effective, shall be submitted to U.S. EPA (in paper and electronic form according to U.S. EPA Region 5 specifications) in the next monthly progress report as described in Paragraph 36 of this Settlement Agreement. U.S. EPA will make available to Respondents validated data generated by U.S. EPA unless it is exempt from disclosure by any federal or state law or regulation. Respondents shall submit to U.S. EPA raw data generated by Respondents, or on Respondents' behalf upon request by U.S. EPA.

b. Respondents shall verbally notify U.S. EPA and the State at least fifteen (15) days prior to conducting significant field events as described in the SOW and SRI/FS Work Plans/Field Sampling Plans. At U.S. EPA's verbal or written request, or the request of U.S. EPA's oversight assistant, Respondents shall allow split or duplicate samples to be taken by U.S. EPA (and its authorized representatives) of any samples collected by Respondents in implementing this Settlement Agreement. All split samples of Respondents shall be analyzed by the methods identified in the QAPP.

49. Data Availability

a. At all reasonable times, U.S. EPA and its authorized representatives shall have the authority to enter and freely move about all property at the Site and off-site areas where Work, if any, is being performed, for the purposes of inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to the Site or Respondents and its contractor pursuant to this Settlement Agreement; reviewing the progress of Respondents in carrying out the terms of this Settlement Agreement; conducting tests as U.S. EPA or its authorized representatives deem necessary; using a camera, sound recording device or other documentary type equipment; and verifying the data submitted to U.S. EPA by Respondents. Respondents shall allow these persons to inspect and copy all records, files, photographs, documents, sampling and monitoring data, and other writings related to Work undertaken in carrying out this Settlement Agreement. Nothing herein shall be interpreted as limiting or affecting U.S. EPA's right of entry or inspection authority under federal law. All persons accessing the Site under this paragraph shall comply with all approved Health and Safety Plans.

b. Respondents may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA and the State under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when it is submitted to U.S. EPA and the State, or if U.S. EPA has notified Respondents that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondents. Respondents agree not to assert confidentiality claims with respect to any data

related to Site conditions, sampling, or monitoring. Respondents shall segregate and clearly identify all documents or information submitted under this Settlement Agreement for which Respondents assert business confidentiality claims.

50. In entering into this Settlement Agreement, Respondents waive any objections to any data gathered, generated, or evaluated by U.S. EPA, the state or Respondents in the performance or oversight of the Work that has been verified according to the quality assurance/quality control (QA/QC) procedures required by the Settlement Agreement or any U.S. EPA-approved Work Plans or Sampling and Analysis Plans. If Respondents object to any other data relating to the SRI/FSSs, Respondents shall submit to U.S. EPA a report that specifically identifies and explains their objections, describes the acceptable uses of the data, if any, and identifies any limitations to the use of the data. The report must be submitted to U.S. EPA within 15 days of the monthly progress report containing the data.

XII. SITE ACCESS AND INSTITUTIONAL CONTROLS

51. If any Area of the Site, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by any of Respondents, such Respondents shall, commencing on the Effective Date, provide U.S. EPA, the State, and their representatives, including contractors, with access at all reasonable times to such Area of the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

52. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondents, Respondents shall use their best efforts to obtain all necessary access agreements within thirty (30) days after the Effective Date, or as otherwise specified in writing by the U.S. EPA Project Coordinator. Respondents shall immediately notify U.S. EPA if after using their best efforts they are unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access, provided however, that Respondents shall not be required to pay sums of money for access to property owned by another PRP whose potential liability for response costs and response actions at the Site is based on a theory of liability other than current owner/operator status under 42 U.S.C. § 9607(a)(1). Respondents shall describe in writing their efforts to obtain access. U.S. EPA may then assist Respondents in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. Respondents shall reimburse U.S. EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XVIII (Payment of Response Costs).

53. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

54. If Respondents cannot obtain access agreements, U.S. EPA may obtain access for Respondents, perform those tasks or activities with U.S. EPA contractors, or terminate the Settlement Agreement. In the event that U.S. EPA performs those tasks or activities with U.S.

EPA contractors and does not terminate the Settlement Agreement, Respondents shall perform all other activities not requiring access to that property, and shall reimburse U.S. EPA for all costs incurred in performing such activities. Respondents shall integrate the results of any such tasks undertaken by U.S. EPA into its reports and deliverables.

XIII. COMPLIANCE WITH OTHER LAWS

55. Respondents shall comply with all applicable local, state and federal laws and regulations when performing the SRI/FSs. No local, state, or federal permit shall be required for any portion of any action conducted entirely on-site, including studies, if the action is selected and carried out in compliance with Section 121 of CERCLA, 42 U.S.C. § 9621. Where any portion of the Work is to be conducted off-site and requires a federal or state permit or approval, Respondents shall submit timely and complete applications and take all other actions necessary to obtain and to comply with all such permits or approvals. This Settlement Agreement is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

XIV. RETENTION OF RECORDS

56. During the pendency of this Settlement Agreement and for a minimum of ten (10) years after commencement of construction of any remedial action for any Area of the Site, each Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until ten (10) years after commencement of construction of any remedial action for any Area of the Site, Respondents shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

57. At the conclusion of this document retention period, Respondents shall notify U.S. EPA at least ninety (90) days prior to the destruction of any such records or documents; and, upon request by U.S. EPA, Respondents shall deliver any such records or documents to U.S. EPA. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondents assert such a privilege, they shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondents. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

Each Respondent hereby certifies individually that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential

liability regarding the Site since notification of potential liability by U.S. EPA or the filing of suit against it regarding the Site and that it has fully complied with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(c) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XV. DISPUTE RESOLUTION

58. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

59. If Respondents object to any U.S. EPA action taken pursuant to this Settlement Agreement, including billings for Future Response Costs, they shall notify U.S. EPA in writing of their objection(s) within fifteen (15) days of such action, unless the objection(s) has/have been resolved informally. U.S. EPA and Respondents shall have forty-five days (45) from U.S. EPA's receipt of Respondents' written objection(s) to resolve the dispute (the "Negotiation Period"). The Negotiation Period may be extended at the sole discretion of U.S. EPA. Such extension may be granted verbally but must be confirmed in writing to be effective.

60. Any agreement reached by the Parties pursuant to this Section shall be in writing and shall, upon signature by the Parties, be incorporated into and become an enforceable part of this Settlement Agreement. If the Parties are unable to reach an agreement within the Negotiation Period, an U.S. EPA management official at the Superfund Branch Chief level or higher will issue a written decision. U.S. EPA's decision shall be incorporated into and become an enforceable part of this Settlement Agreement. Respondents' obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondents shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs. Respondents shall proceed in accordance with U.S. EPA's final decision regarding the matter in dispute, regardless of whether Respondents agree with the decision. If Respondents do not agree to perform or do not actually perform the Work in accordance with U.S. EPA's final decision, U.S. EPA reserves the right in its sole discretion to conduct the Work itself, to seek reimbursement from Respondents, to seek enforcement of the decision, to seek stipulated penalties, and/or to seek any other appropriate relief.

XVI. STIPULATED PENALTIES

61. Respondents shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraphs 62 and 63 for failure to comply with any of the requirements of this Settlement Agreement specified below unless excused under Section XVII (Force Majeure). "Compliance" by Respondents shall include completion of the Work under this Settlement Agreement or any activities contemplated under any of the SRI/FS Planning Documents, work plans or other plans approved under this Settlement Agreement identified below in accordance with all applicable

requirements of law, this Settlement Agreement, the SOW, and any plans or other documents approved by U.S. EPA pursuant to this Settlement Agreement and within the specified time schedules established by and approved under this Settlement Agreement.

62. Stipulated Penalty Amounts - Work

a. The following stipulated penalties shall accrue per day for any noncompliance identified with required Work, including the following: failure to meet due dates for payments of Future Response Costs; failure to establish escrow accounts in the event of disputes; and/or failure to timely or adequately implement work as prescribed in the SOW and any approved SRI/FS Planning Documents and Schedules.

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$ 500	1 st through 14 th day
\$ 1,000	15 th through 30 th day
\$ 2,000	31 st day and beyond

63. Stipulated Penalty Amounts - SRI/FS Planning Documents, Reports, and Technical Memoranda

a. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate plans, reports, technical memoranda, or other written documents required by Section III: (Tasks 1 through 7) of the SOW in accordance with the Schedule in Exhibit A of the SOW:

<u>Penalty Per Violation Per Day</u>	<u>Period of Noncompliance</u>
\$ 500	1 st through 14 th day
\$ 1,000	15 th through 30 th day
\$ 2,500	31 st day and beyond

64. Respondents shall be liable for stipulated penalties in the amount of \$250 per day for the first week or part thereof and \$500 per day for each week or part thereof thereafter for failure to meet any other obligation under this Settlement Agreement including the SOW.

65. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: (1) with respect to a deficient submission under Section X (U.S. EPA Approval of Plans and Other Submissions), during the period, if any, beginning on the 21st day after U.S. EPA's receipt of

such submission until the date that U.S. EPA notifies Respondents of any deficiency; and (2) with respect to a decision by the U.S. EPA Management Official at the Superfund Branch Chief level or higher, under Paragraph 60 of Section XV (Dispute Resolution), during the period, if any, beginning on the 14th day after the Negotiation Period begins until the date that the U.S. EPA management official issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

66. Following U.S. EPA's determination that Respondents have failed to comply with a requirement of this Settlement Agreement, U.S. EPA may give Respondents written notification of the same and describe the noncompliance. U.S. EPA may send Respondents a written demand for the payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondents of a violation.

67. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondents' receipt from U.S. EPA of a demand for payment of the penalties, unless Respondents invoke the dispute resolution procedures in accordance with Section XV (Dispute Resolution). All payments to U.S. EPA under this Section shall be paid by certified or cashier's check(s) made payable to "EPA Hazardous Substances Superfund," shall be mailed to U.S. EPA, Superfund Program Accounting and Analysis Section, P.O. Box 70753, Chicago, Illinois 60673, shall indicate that the payment is for stipulated penalties, and shall reference the U.S. EPA Region and Site/Spill ID Number MID006007306, the title of this Settlement Agreement (including U.S. EPA Docket Number VN-07-C-014), and the name and address of the party(ies) making payment. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s) shall be sent to:

Jacqueline Clark
Site Attorney
Office of Regional Counsel
Mail Code C-14J
77 West Jackson
Chicago, IL 60604-3590

Shari Kolak
Remedial Project Manager
Superfund Division
Mail Code SR-6J
77 West Jackson
Chicago, IL 60604-3590

68. The payment of penalties shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement Agreement.

69. Penalties shall continue to accrue as provided in Paragraph 66 during any dispute resolution period, but need not be paid until fifteen (15) days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

70. If Respondents fail to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as interest. Respondents shall pay interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 67.

71. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Section 122(l) of CERCLA, 42 U.S.C. § 9622(l), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 122(l) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of willful violation of this Settlement Agreement or in the event that U.S. EPA assumes performance of a portion or all of the Work pursuant to Section XX (Reservation of Rights by U.S. EPA), Paragraph 82. Notwithstanding any other provision of this Section, U.S. EPA may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XVII. FORCE MAJEURE

72. Respondents agree to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, *force majeure* is defined as any event arising from causes beyond the control of Respondents or of any entity controlled by Respondents, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondents' best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work or increased cost of performance.

73. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondents shall notify U.S. EPA orally within 48 hours of when Respondents first knew that the event might cause a delay. Within five (5) business days thereafter, Respondents shall provide to U.S. EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents' rationale for attributing such delay to a *force majeure* event if they intend to assert such a claim; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall preclude Respondents from asserting any claim of *force majeure* for that event for the period of time of such failure to comply and for any additional delay caused by such failure.

74. If U.S. EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA does not agree that the delay or anticipated delay has been or will

be caused by a *force majeure* event, U.S. EPA will notify Respondents in writing of its decision. If U.S. EPA agrees that the delay is attributable to a *force majeure* event, U.S. EPA will notify Respondents in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XVIII. PAYMENT OF RESPONSE COSTS

75. Payments for Future Response Costs

a. Respondents shall pay U.S. EPA all Future Response Costs not inconsistent with the NCP. On a periodic basis, U.S. EPA will send Respondents a bill requiring payment that includes Region 5's Itemized Cost Summary, which includes direct and indirect costs incurred by U.S. EPA and its contractors. Respondents shall make all payments within 30 days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 81 of this Settlement Agreement. Payment shall be made to U.S. EPA by Electronics Funds Transfer ("EFT") in accordance with current EFT procedures to be provided to Respondents by U.S. EPA Region 5. Payment shall be accompanied by a statement identifying the name and address of the party(ies) making payment, the Site name, U.S. EPA Region 5, the Site/Spill ID Number MID006007306 and, the account number.

b. At the time of payment, Respondents shall send notice that payment has been made to:

Jacqueline Clark
Site Attorney
Office of Regional Counsel (C-14J)
77 West Jackson Blvd.
Chicago, IL 60604-3590

Shari Kolak
Regional Project Manager
Superfund Division (SR-6J)
77 West Jackson Blvd.
Chicago, IL 60604-3590

c. The total amount to be paid for each Area of the Site where Respondents conduct SRI/FS activities, by Respondents pursuant to Subparagraph 76.a. shall be deposited in the Allied Paper/Portage Creek/Kalamazoo River Site Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site or to be transferred by EPA to the EPA Hazardous Substance Superfund.

76. If Respondents do not pay Future Response Costs within thirty days (30) of Respondents' receipt of a bill, Respondents shall pay Interest on the unpaid balance. The Interest on unpaid Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. If U.S. EPA receives a partial payment, Interest shall accrue on any unpaid balance. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section, including but not limited to, payments of stipulated penalties pursuant to Section XVI. Respondents shall make all payments required by this Paragraph in the manner described in Paragraph 76.

77. Respondents may contest payment of any Future Response Costs under Paragraph 76 if they determine that U.S. EPA has made an accounting error or if they believe U.S. EPA incurred excess costs as a direct result of an U.S. EPA action that was inconsistent with the NCP. Such objection shall be made in writing within thirty (30) days of receipt of the bill and must be sent to the U.S. EPA Project Coordinator. Any such objection shall specifically identify the contested Future Response Costs and the basis for objection. In the event of an objection, Respondents shall within the 30-day period pay all uncontested Future Response Costs to U.S. EPA in the manner described in Paragraph 76. Simultaneously, Respondents shall establish an interest-bearing escrow account in a federally insured bank duly chartered in the State of Michigan and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. Respondents shall send to the U.S. EPA Project Coordinator a copy of the transmittal letter and check paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, Respondents shall initiate the Dispute Resolution procedures in Section XV (Dispute Resolution). If U.S. EPA prevails in the dispute, within five (5) days of the resolution of the dispute, Respondents shall pay the sums due (with accrued interest) to U.S. EPA in the manner described in Paragraph 76. If Respondents prevail concerning any aspect of the contested costs, Respondents shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to U.S. EPA in the manner described in Paragraph 76. Respondents shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XV (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Respondents' obligation to reimburse U.S. EPA for its Future Response Costs.

XIX. COVENANT NOT TO SUE BY U.S. EPA

78. In consideration of the actions that will be performed and the payments that will be made by Respondents under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for performance of the Work and for recovery of Future Response Costs. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondents of all obligations under this Settlement Agreement including, but not limited to, payment of Future Response Costs pursuant to Section XVIII. This covenant not to sue extends only to Respondents and does not extend to any other person.

XX. RESERVATIONS OF RIGHTS BY U.S. EPA

79. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions

necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

80. The covenant not to sue set forth in Section XIX, above, does not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondents with respect to all other matters including, but not limited to:

- a. claims based on a failure by Respondents to meet a requirement of this Settlement Agreement;
- b. liability for costs not included within the definition of Future Response Costs;
- c. liability for performance of response action other than the Work;
- d. criminal liability;
- e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;
- f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site;
- g. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site; and
- h. liability for costs incurred if U.S. EPA assumes the performance of the Work pursuant to Paragraph 82.

81. Work Takeover. In the event U.S. EPA determines that Respondents have ceased implementation of any portion of the Work, are deficient or late in their performance of the Work, or are implementing the Work in a manner which may cause an endangerment to human health or the environment, U.S. EPA may assume the performance of all or any portion of the Work as U.S. EPA determines necessary. Respondents may invoke the procedures set forth in Section XV (Dispute Resolution) to dispute U.S. EPA's determination that takeover of the Work is warranted under this Paragraph. Notwithstanding any other provision of this Settlement Agreement, U.S. EPA retains all authority and reserves all rights to take any and all response actions authorized by law.

XXI. COVENANT NOT TO SUE BY RESPONDENTS

82. Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Future Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of the Work or arising out of the response actions for which the Future Response Costs have or will be incurred, including any claim under the United States Constitution, the Michigan Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Work or payment of Future Response Costs.

83. These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Paragraphs 80 (b), (c), and (e) - (g), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

84. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXII. OTHER CLAIMS

85. By issuance of this Settlement Agreement, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondents.

86. Except as expressly provided in Section XIX (Covenant Not to Sue by U.S. EPA), nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

87. No action or decision by U.S. EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review.

XXIII. CONTRIBUTION

88. a. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondents are entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work and Future Response Costs.

b. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B), pursuant to which the Respondents have, as of the Effective Date, resolved their liability to the United States for the Work and Future Response Costs.

c. Nothing in this Settlement Agreement precludes the United States or Respondents from asserting any claims, causes of action, or demands for indemnification, contribution, or cost recovery against any person not a party to this Settlement Agreement. Nothing herein diminishes the right of the United States, pursuant to Section 113(f)(2) and (3), 42 U.S.C. § 9613(f)(2) and (3), to pursue any such persons to obtain additional response costs or response action, and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2).

XXIV. INDEMNIFICATION

89. Respondents shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees, and representatives from any and all claims or causes of action arising from, or on account of negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondents agree to pay the United States all costs incurred by the United States including, but not limited to, attorneys fees and other expenses of litigation and settlement arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondents in carrying out activities pursuant to this Settlement Agreement. Neither Respondents nor any such contractor shall be considered an agent of the United States.

90. The United States shall give Respondents notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

91. Respondents waive all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account

of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site. In addition, Respondents shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site.

XXV. INSURANCE

92. At least thirty (30) days prior to commencing any On-Site Work under this Settlement Agreement, Respondents shall secure, and shall maintain for the duration of this Settlement Agreement, comprehensive general liability insurance and automobile insurance with limits of \$2 million dollars, combined single limit, naming the United States as an additional insured. Within the same period, Respondents shall provide U.S. EPA with certificates of such insurance and a copy of each insurance policy. Respondents shall submit such certificates and copies of policies each year on the anniversary of the Effective Date. In addition, for the duration of the Settlement Agreement, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondents in furtherance of this Settlement Agreement. If Respondents demonstrate by evidence satisfactory to U.S. EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondents need provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXVI. FINANCIAL ASSURANCE

93. Within 45 days of the Effective Date, Respondents shall establish and maintain financial security in the amount of \$2 million in one or more of the following forms, which must be satisfactory in form and substance to U.S. EPA. In the event Respondents establish and maintain such financial security in one of the forms identified in Subparagraphs 93.a. through 93.d. of this Paragraph, Respondents may establish and maintain such financial security jointly:

- a. a surety bond unconditionally guaranteeing payment and/or performance of the Work;
- b. one or more irrevocable letters of credit, payable to or at the direction of U.S. EPA, issued by financial institution(s) acceptable in all respects to U.S. EPA equaling the total estimated cost of the Work;
- c. a trust fund administered by a trustee acceptable in all respects to U.S. EPA;
- d. a policy of insurance issued by an insurance carrier acceptable in all respects to U.S. EPA, which ensures the payment and/or performance of the Work;

- e. a corporate guarantee to perform the Work provided by one or more parent corporations or subsidiaries of Respondents, or by one or more unrelated corporations that have a substantial business relationship with at least one of Respondents; including a demonstration that any such company satisfied the financial test requirements of 40 C.F.R. § 264.143(f);
- f. a corporate guarantee to perform the Work by one or more of Respondents, including a demonstration that any such Respondent satisfies the requirements of 40 C.F.R. § 143(f); and/or
- g. any other financial mechanism acceptable to and approved by U.S. EPA.

94. In order to ensure the full and final completion of Work by Respondents, based upon the current cost estimate of \$15 million for all Work at the Site where Respondents conduct SRI/FS activities, the Respondents shall increase the amount of financial security as follows:

- a. upon the first anniversary of the Effective Date of the Administrative Settlement Agreement and Order on Consent for a Removal Action at the Plainwell Impoundment ("Removal AOC"), which is being executed by U.S. EPA simultaneously with the execution of this Settlement Agreement, Respondents shall increase the amount of financial security for the Work required under this Settlement Agreement by \$6.5 million, such that the total amount of financial security established and maintained by Respondents for the Work required by this Settlement Agreement equals \$8.5 million; and
- b. upon U.S. EPA's written notice of completion of removal action work pursuant to Paragraph 77 of the Removal AOC, or no later than 3 years from the Effective Date of this Settlement Agreement, whichever occurs earlier, Respondents shall increase the amount of financial security for the Work required under this Settlement Agreement such that the total amount of financial security established and maintained by Respondents for the Work required under this Settlement Agreement equals \$15 million.

For each increase in financial security required under this Paragraph, Respondents shall use the same financial assurance instrument that is obtained and presented to U.S. EPA pursuant to Paragraph 93.

95. Any and all financial assurance instruments provided pursuant to this Section shall be in form and substance satisfactory to U.S. EPA, determined in U.S. EPA's sole discretion. In the event that U.S. EPA determines at any time that the financial assurances provided pursuant to this Section (including, without limitation, the instrument(s) evidencing such assurances) are inadequate, Respondents shall, within thirty (30) days of receipt of notice of U.S. EPA's determination, obtain and present to U.S. EPA for approval one of the other forms of financial assurance listed in Paragraph 93, above. In addition, if at any time U.S. EPA notifies Respondents that the anticipated cost of completing the Work has increased, then, within thirty

(30) days of such notification, Respondents shall obtain and present to U.S. EPA for approval a revised form of financial assurance (otherwise acceptable under this Section) that reflects such cost increase. Respondents' inability to demonstrate financial ability to complete the Work shall in no way excuse performance of any activities required under this Settlement Agreement.

96. If Respondents seek to ensure completion of the Work through a guarantee pursuant to Subparagraph 93.e. or 93.f. of this Settlement Agreement, Respondents shall (i) demonstrate to U.S. EPA's satisfaction that the guarantor satisfies the requirements of 40 C.F.R. § 264.143(f); and (ii) resubmit sworn statements conveying the information required by 40 C.F.R. § 264.143(f) annually, on the anniversary of the Effective Date, to U.S. EPA. For the purposes of this Settlement Agreement, wherever 40 C.F.R. § 264.143(f) references "sum of current closure and post-closure costs estimates and the current plugging and abandonment costs estimates," the current cost estimate of \$15 million for all Work at the Site where Respondents conduct SRI/FS activities shall be used in relevant financial test calculations.

97. If, after the Effective Date, Respondents can show that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 93 of this Section, Respondents may, on any anniversary date of the Effective Date, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining Work to be performed. Respondents shall submit a proposal for such reduction to U.S. EPA, in accordance with the requirements of this Section, and may reduce the amount of the security after receiving written approval from U.S. EPA. In the event of a dispute, Respondents may seek dispute resolution pursuant to Section XV (Dispute Resolution) and may reduce the amount of security in accordance with U.S. EPA's written decision resolving the dispute.

98. Respondents may change the form of financial assurance provided under this Section at any time, upon notice to and prior written approval by U.S. EPA, provided that U.S. EPA determines that the new form of assurance meets the requirements of this Section. In the event of a dispute, Respondents may change the form of the financial assurance only in accordance with the written decision resolving the dispute.

XXVII. SEVERABILITY/INTEGRATION/APPENDICES

99. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondents have sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondents shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

100. This Settlement Agreement, including its appendices, and any deliverables, technical memoranda, specifications, schedules, documents, plans, reports (other than progress reports), etc. that will be developed pursuant to this Settlement Agreement and become incorporated into and enforceable under this Settlement Agreement constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this

Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following appendices are attached to and incorporated into this Settlement Agreement:

- "Attachment A" is the SOW.
- "Attachment B" is the map of the Site.
- "Attachment C" is the Work Plan.

XXVIII. ADMINISTRATIVE RECORD

101. U.S. EPA will determine the contents of the administrative record file for each area where Respondents conduct SR/FS activities for selection of the remedial action. Respondents shall submit to U.S. EPA documents developed during the course of each SR/FS upon which selection of the response action may be based. Upon request of U.S. EPA, Respondents shall provide copies of plans, task memoranda for further action, quality assurance memoranda and audits, raw data, field notes, laboratory analytical reports, and other reports. Upon request of U.S. EPA, Respondents shall additionally submit any previous studies conducted under state, local or other federal authorities relating to selection of the response action, and all communications between Respondents and state, local, or other federal authorities concerning selection of the response action. At U.S. EPA's discretion, Respondents shall establish a community information repository at or near the Site, to house one copy of the administrative record.

XXIX. EFFECTIVE DATE AND SUBSEQUENT MODIFICATION

102. This Settlement Agreement shall be effective the day the Settlement Agreement is signed by the Director of the Superfund Division or his/her delegatee.

103. This Settlement Agreement may be amended by mutual agreement of U.S. EPA and Respondents. Amendments shall be in writing and shall be effective when signed by U.S. EPA. U.S. EPA Project Coordinators do not have the authority to sign amendments to the Settlement Agreement.

104. No informal advice, guidance, suggestion, or comment by the U.S. EPA Project Coordinator or other U.S. EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondents shall relieve Respondents of their obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

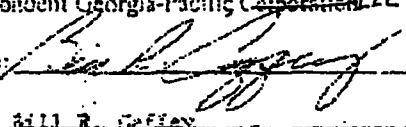
XXX. NOTICE OF COMPLETION OF WORK

105. When U.S. EPA determines, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including but not limited to payment of Future Response Costs or record retention, U.S. EPA will provide written notice to Respondents. If U.S. EPA determines that any such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondents, provide a list of the deficiencies, and require that Respondents modify the SRI/FS Planning Documents or other work plan if appropriate in order to correct such deficiencies. Respondents shall implement the modified and approved SRI/FS Planning Documents or other approved work plan and shall submit the required deliverable(s) in accordance with the U.S. EPA notice. Failure by Respondents to implement the approved modified R/FS Planning Documents or other work plan shall be a violation of this Settlement Agreement.

The Undersigned Party enters into this Administrative Settlement Agreement and Order on Consent for Supplemental Remedial Investigations and Feasibility Studies in the matter of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site.

Agreed this 15 day of FEBRUARY, 2007.

For Respondent Georgia-Pacific Corporation, LLC

JMD Signature: 

Name: Bill R. Coffey

Title: EVE Operations & Compliance

Address: 133 Peachtree Street
Atlanta, GA. 30303

The Undersigned Party enters into this Administrative Settlement Agreement and Order on Consent for Supplemental Remedial Investigations and Feasibility Studies in the matter of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site.

Agreed this 15 day of February, 2007.

For Respondent Millennium Holdings, LLC

Signature: Deborah W Kryak

Name: DEBORAH W. KRYAK

Title: Director, Retained Liabilities

Address: 1221 McKinney Houston TX

It is so ORDERED AND AGREED this 21st day of February, 2007.

BY: Richard C. Karl DATE: 2-21-07

Richard C. Karl, Director
Superfund Division
U.S. Environmental Protection Agency
Region 5

EFFECTIVE DATE: 2/21/07

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STATE OF MICHIGAN

DEPARTMENT OF NATURAL RESOURCES

IN THE MATTER OF:

Allied Paper/Portage Creek/Kalamazoo River FINAL ORDER NO. DFO-ERD-91-001
Superfund (National Priorities List) Site

ADMINISTRATIVE ORDER BY CONSENT

1. This Administrative Order by Consent (hereinafter the Order) is entered into voluntarily by and between the Michigan Department of Natural Resources (hereinafter the MDNR), and all of the undersigned Respondents, (hereinafter the Respondents). The Order concerns the preparation of, performance of, and reimbursement of oversight cost for the Remedial Investigation and Feasibility Study (hereinafter the RI/FS) for the listed Superfund Site known as the Allied Paper, Inc./Portage Creek/Kalamazoo River Site (hereinafter the Site). This Order is issued pursuant to the authority vested in the MDNR by Section 7(2) of 1929 P.A. 245, as amended, (the Water Resources Commission Act (hereinafter the WRCA)), being MCL 323.7(2); MSA 3.527(2), and pursuant to the Cooperative Agreement with U.S. EPA, dated December 28, 1990 and the attachments. The Respondents agree not to contest the authority or jurisdiction of the MDNR to issue this Order in any subsequent proceeding to enforce the terms of this Order. The Respondents further agree not to contest this Order pursuant to Section 7(3) of the WRCA. This Order constitutes an enforceable agreement between the State and Respondents pursuant to Section 10 of the WRCA.

DENIAL OF LIABILITY

2. This Order is the product of settlement negotiations. Its execution is intended to serve the public interest and the interests of judicial and litigant economy. The parties agree that its execution shall not constitute an admission of fact or law with respect to any issue dealt with in this Order, nor shall it constitute evidence of same.

PARTIES BOUND

3. This Order shall apply to and be binding upon the MDNR and Respondents, their agents, successors, and assigns, and upon all persons, acting under or for the parties. No change or changes in the ownership or corporate status of any of the Respondents shall in any way alter the Respondents' responsibilities under this Order. Each Respondent shall provide a copy of this Order to any subsequent owners or successors before ownership rights are transferred. The Respondents shall be jointly and severally liable for the performance of the activities specified in the Order and for penalties arising from this Order. The signatories to this Order certify that they are authorized to execute and legally bind the parties they represent.

4. The Respondents shall provide a copy of this Order to all contractors, subcontractors, laboratories, and consultants retained to conduct any portion of the work performed pursuant to this Order, within fourteen (14) calendar

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EXHIBIT	
1003	
DEPONENT NAME:	DATE:
Paul Montney	8/16/94

days after the effective date of this Order or after the date of such retention. Notwithstanding the terms of any contract, Respondents are responsible for compliance with this Order and for ensuring that their contractors and agents comply with this Order. Any reference herein to the Order shall mean the Order, any Appendix thereto including any future modifications as provided by the terms of the Order as may be added hereafter, including, any reports, plans, specifications, schedules, and appendices required by this Order which, upon approval of MDNR, shall be incorporated into and enforceable under the Order.

STATEMENT OF PURPOSE

5. In entering into the Order, the mutual objectives of MDNR and the Respondents are: (a) to determine the nature and extent of contamination and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants or contaminants from the Site by conducting a remedial investigation; and (b) to determine and evaluate alternatives for remedial action (if any) to prevent, mitigate or otherwise respond to or remedy any release or threatened release of hazardous substances, pollutants, or contaminants from the Site by conducting a feasibility study.

6. The activities conducted under this Order are subject to approval by MDNR and shall provide all appropriate necessary information for the RI/FS, and for a Record of Decision that is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (hereinafter the CERCLA) 42 U.S.C. Section 9601 et seq.; the National Contingency Plan (hereinafter the NCP), 40 Code of Federal Regulations (hereinafter the C.F.R.) Part 300, 55 Federal Register (hereinafter the Fed. Reg.) No. 46 p 8666 et seq. (March 8, 1990), the Michigan Environmental Response Act, 1982 P.A. 307 (hereinafter the Act 307) and its administrative rules and the Cooperative Agreement with EPA, dated December 27, 1990.

FINDINGS OF FACT

The MDNR has determined, but the Respondents do not acknowledge the following findings of fact:

7. The Site includes Portage Creek from Cork Street to its confluence with the Kalamazoo River and the Kalamazoo River downstream to Allegan City Dam. The Site includes about 3 miles of Portage Creek and 35 miles of the Kalamazoo River from the City of Kalamazoo to the City of Allegan. The Kalamazoo River flows in a westerly direction and is a major tributary to southern Lake Michigan.

8. The sediments, water column and biota in the Kalamazoo River/Portage Creek Site are contaminated with polychlorinated biphenyls (hereinafter PCBs), a hazardous substance and probable human carcinogen. Based on numerous studies conducted between 1972 and 1989, the MDNR has estimated that there are about 200,000 pounds of PCBs in the sediments in and adjacent to Portage Creek and the Kalamazoo River at this Site. PCBs continue to migrate off-site due to the river flow, and substantially contribute to the ongoing contamination of Lake Michigan. The Michigan Department of Public Health has issued a fish consumption advisory (1990) for this site due to PCB contamination. This

warning has been reissued annually since 1977. The Site, including additional portions of the Kalamazoo River, has been designated an environmental contamination site under State Act 307 due to the PCB contamination. In addition, a portion of the Kalamazoo River has been identified as an Area of Concern by the International Joint Commission because of its detrimental impact on Lake Michigan due to the PCB contamination.

8a. Groundwater investigations have identified several plumes of contamination adjacent to Bryant Mill Pond on Portage Creek. Hazardous contaminants identified to date include PCBs, arsenic, lead, phenols, benzene, pentachlorophenol, ethyl benzene, toluene, xylene, tetrachloroethene, cadmium, copper, mercury, nickel, and zinc.

9. The Site was included on the National Priorities List (NPL) pursuant to Section 105 of CERCLA. See 40 C.F.R. Part 300, Appendix B, and 55 Fed. Reg. No.169 p 35519 (August 30, 1990).

9a. The MDNR has identified three potentially responsible parties for the PCB contamination. These are HM Holdings Inc./Allied Paper Inc., Georgia Pacific Corporation and Simpson Plainwell Paper Company.

9b. These three parties have been identified as potentially responsible parties due to past business operations involving the recycling of paper, including deinking, during the period 1950-1975. During this period, PCBs were commonly used in certain types of paper, especially carbonless copy paper. The recycling of paper, including deinking by these parties resulted in the discharge of PCBs to the river, either directly or by sludge disposal practices. The presence of PCB contaminated waste disposal sites located on each of their properties adjacent to Portage Creek or the Kalamazoo River is a direct result of waste treatment systems operated to control the river pollution, and is indicative of the extent of the river contamination.

10. In December, 1987, the State of Michigan filed suit in Federal District Court against HM Holdings Incorporated/Allied Paper Company seeking, among other things, remediation of Bryant Mill Pond on Portage Creek. A consent order was entered in December, 1988, regarding adjacent contaminated lagoon and landfill areas and the point source discharge of PCBs. However, the issue of remediation of Bryant Mill Pond has not been resolved.

11. MDNR has arranged for oversight and review of the RI/FS by both qualified MDNR personnel and qualified contractors.

DETERMINATIONS

12. On the basis of the Findings of Fact, MDNR has determined, but Respondents do not acknowledge that:

- a. Each Respondent is a "person" as defined in Section 101(21) of CERCLA, 42 U.S.C. Section 9601(21).
- b. Each Respondent is a "responsible party" under Section 107(a) and a "potentially responsible party" within the meaning of Section 122 of CERCLA, 42 U.S.C. Sections 9607(a) and 9622.

- c. The Site is a "facility" within the meaning of Section 101(9) of CERCLA, 42 U.S.C. Section 9601(9).
- d. The substances identified at the Site are "hazardous substances" within the meaning of Section 101(14) of CERCLA, 42 U.S.C. Section 9601(14).
- e. The past, present or potential future migration into the environment of hazardous substances, pollutants or contaminants at or from the Site constitutes an actual "release" or a substantial threat of a "release" into the "environment" as those terms are defined in Sections 101(8) and 101(22) of CERCLA, 42 U.S.C. Sections 9601(8) and 9601(22).
- f. The actions called for in this Order will be consistent with the NCP to the extent that the NCP is consistent with CERCLA provided that the Respondents conduct such actions properly and promptly pursuant to this Order.
- g. It is necessary, in order to protect the public health and welfare and the environment, to conduct an RI/FS to determine the full nature and extent of contamination that exists at or near the Site and to determine what remedial actions are necessary to be carried out at the Site, or secured through enforcement action.
- h. The RI/FS will be conducted properly and promptly by the Respondents, provided that these actions are conducted as described in the Appendix 1 [Statement of Work] and any modifications thereto, and pursuant to all conditions of the Order.
- i. The Respondents are qualified to conduct the RI/FS, if the Respondents engage a qualified contractor pursuant to Paragraph 17 of this Order.
- j. MDNR has arranged for the oversight and review of the RI/FS by qualified State personnel and qualified contractors.

ORDER

MDNR AND THE RESPONDENTS HEREBY AGREE, AND MDNR HEREBY ORDERS THAT:

13. Implementation: Subject to MDNR's rights to implement its own RI/FS pursuant to Paragraph 45, the Respondents shall perform the RI/FS in accordance with the Statement of Work (hereinafter the SOW), in Appendix 1, and with any modifications made or required by MDNR to bring documents and/or deliverables prepared by the Respondents under this Order into conformance with the requirements of CERCLA, the SOW, and modifications to the SOW, and any work plans prepared under this Order or the SOW, which are incorporated by reference into this Order. Upon the effective date of this Order, Respondents shall commence implementation of this Order and work required by the Statement of Work, and shall conclude implementation of such in accordance with the terms and schedules set forth in this Order, Appendix 1, and any approved Work Plans. The activities conducted pursuant to this Order are subject to approval by MDNR and shall be consistent with the NCP to the extent that the

NCP is consistent with CERCLA. If any inconsistencies between the NCP and CERCLA exist, CERCLA shall govern. Furthermore, if the NCP is amended prior to the signing of a Record of Decision for final remedial action at the Site, MDNR may modify or require modification to the SOW and to any approved Work Plan or other deliverable accordingly, or may require Respondents to develop a new Work Plan or other deliverable accordingly, and the Respondents shall conduct all activities required by the new or modified Work Plan or other deliverable.

MDNR may determine that additional tasks, including remedial investigatory work and/or engineering evaluations, conducted independently of this Order and in addition to MDNR approved tasks and deliverables, but consistent with this Order are part of an RI/FS. The Respondents shall implement any additional tasks which MDNR determines are necessary as part of performing the activities required under this Order. The additional tasks shall be completed in accordance with the standards, specifications, and schedule determined or approved by MDNR.

14. Reimbursement of MDNR Oversight Costs: The Respondents shall reimburse the MDNR or the Hazardous Substances Superfund, as the case may be, for all costs, including interest, incurred after the effective date of this Order by MDNR in overseeing this Order and by MDNR under or in connection with a contract or arrangement between MDNR and a qualified person to assist MDNR in overseeing and reviewing the conduct of activities required under this Order. Reimbursable oversight costs shall include all direct and indirect costs of MDNR's oversight arrangements for the RI/FS, including, but not limited to, time and travel costs of MDNR personnel and associated indirect costs, contractor costs, all costs incurred in conducting a Health Assessment for the Site, compliance monitoring, including the collection and analysis of split samples, inspection of RI/FS activities, site visits, interpretation of Order provisions, discussions regarding disputes that may arise under this Order, review of reports and deliverables under this Order, the costs of redoing any of Respondents' tasks, and any interest that begins to accrue from the due date set forth in the demand for costs incurred.

15. Following each anniversary of the effective date of this Order, MDNR will provide Respondents with a summary of all oversight costs, by major cost categories, incurred during the preceding year with respect to the Site. Respondents shall, within 30 days of receipt of each annual oversight costs summary, remit a certified check for the amount of those costs, made payable to the State of Michigan. If Respondents dispute an oversight cost, pursuant to the procedures of Paragraph 36 Respondents may initiate dispute resolution if Respondents notify MDNR in writing within fifteen (15) days of receipt of the oversight cost summary. Respondents shall pay all oversight costs other than the disputed portion in accordance with this Paragraph. Checks for such payments shall identify the name of the Site and docket number for this Order, and be mailed to:

Assistant Attorney General In Charge
Environmental Protection Division
P.O. Box 30212
Lansing, MI 48909

A copy of the transmittal letter and the check shall be provided simultaneously to the MDNR Project Manager (hereinafter the PM).

16. Observation of Respondents' RI/FS Activities: The Respondents shall allow MDNR's employees, agents, consultants, contractors, and authorized representatives to observe the Respondents' work at the Site in implementing the activities pursuant to this Order. The Respondents shall permit such persons to inspect and copy all non-attorney-client and/or non-attorney work product privileged records, documents, files or other writings related to the Respondents' RI/FS activities and record all RI/FS field activities by means of photographic or other recording equipment; to enter and to freely move about all property on or about the Site; to conduct such tests as MDNR may deem necessary; and to verify the data submitted to MDNR by the Respondents.

17. Engagement of a Contractor: Within forty-five (45) days of the effective date of this Order, the Respondents shall engage a qualified Contractor to perform the technical activities required under this Order. The Contractor shall employ key personnel dedicated to the RI/FS that shall be experienced in performing investigations and studies at hazardous waste sites. All work performed by said Contractor pursuant to this Order shall be under the general direction and supervision of a qualified individual with expertise in hazardous waste site investigation and clean-up. Such professional staff sufficient to perform the RI/FS shall be employed by the Contractor prior to engagement by the Respondents. Written notice of the engagement of the Contractor shall be provided to MDNR within five (5) days of such engagement, and a copy of the Respondents' contract with the Contractor, including a statement of qualifications and identification of project personnel, and language dedicating the specific professional staff devoted to the project, shall be provided to MDNR at that time. The Respondents shall notify MDNR regarding the identity and qualifications of all subcontractors as soon as each subcontractor is engaged or at least two weeks prior to the subcontractor's commencement of site work, whichever occurs first. MDNR shall have the right to disapprove, based on professional qualifications, conflicts of interest and/or deficiencies in previous similar work, any Contractor engaged directly or indirectly by the Respondents to conduct work activities under this Order.

18. Financial Assurance: Within thirty (30) days after the effective date of this Order and annually thereafter until certification of the work under Paragraph 43 of this Order, one or more of the Respondents shall demonstrate to MDNR that they meet one of the financial assurance mechanisms specified in 40 C.F.R. Section 264.143 for the estimated costs of work to be performed by Respondents under this Order. Financial Assurance(s) provided pursuant to this paragraph shall total three million dollars (\$3,000,000.00).

19. Designation of Respondents' Project Coordinator: Within ten (10) calendar days of the effective date of this Order, the Respondents shall designate a Project Coordinator who shall be responsible for the administration of all actions called for by this Order and shall submit the respective coordinator's name, address and telephone number to MDNR. Any subsequent change in the Respondents' Project Coordinator shall be accomplished by notifying MDNR in writing at least ten (10) calendar days prior to the change.

20. Designation of Government Coordinators: MDNR will designate a Project Manager (PM) for administration of its responsibilities, for oversight of the day-to-day activities conducted under the Order, and for receipt of all written matter required by the Order. MDNR may also designate assistant PMs as necessary. In addition, MDNR will designate a Section Chief (hereinafter the SC) who shall be responsible for the findings of approval/disapproval and comments on major project deliverables under this Order. MDNR will submit the PM's, assistant PM's and SC's name, address and telephone number to the Respondents within fifteen (15) calendar days of the effective date of this Order. The PM and assistant PMs shall have the authority vested in the On-Scene Coordinator and the Remedial Project Manager by the National Contingency Plan, 40 C.F.R. Part 300 et. seq.. This includes the authority to halt, conduct, or direct any tasks required by this Order and/or any response action, or portions thereof when conditions present an immediate risk to public health or welfare or the environment. The absence of the MDNR PM or assistant PMs from the Site shall not be cause for the Respondents to halt actions at the Site. Any subsequent change in the MDNR PM, assistant PMs or SC shall similarly be accomplished by notifying the Respondents in writing.

21. Site Access: RESPONDENTS shall guarantee access to their property at the Site for the purpose of implementing this Order. To the extent that any area where work is to be performed under this Order is owned or controlled by persons other than Respondents, the Respondents shall use their best efforts to obtain site access agreements from all site property owners and from owners of any other property on which work is necessary under this Order. Such agreements shall, at a minimum, allow the Respondents and their contractors, MDNR, its designated coordinators, agents, employees, authorized representatives and contractors, to enter freely, and move about for the purpose of implementing this Order or overseeing the Respondents' implementation of this Order. In the event that Respondents conclude that they are unable to obtain a necessary access agreement within the time referenced in the work plan, the Respondents shall immediately notify MDNR in writing and shall include in such notification the name, address and telephone number of the property owner, the location of the property, a description of the efforts made by the Respondents to obtain the necessary access and the reason for their lack of success. The Respondents agree to reimburse MDNR for any costs MDNR may incur in exercising its authority to gain access to the Site.

22. Creation of Danger: Upon the occurrence of any event during the RI/FS that causes or threatens any release of hazardous substances, pollutants or contaminants from the Site into the environment which may threaten the public health, welfare, or the environment, the Respondents shall immediately notify the MDNR Pollution Emergency Alert System (hereinafter PEAS) by calling telephone number 1-800-292-4706 in Michigan or 1-517-373-7660 from out of state and the MDNR PM within twenty-four (24) hours, or in the event of his or her unavailability, shall notify within the same twenty-four (24) hour period, Chief of the Environmental Response Division, MDNR, setting forth: the events that have occurred; the measures taken and to be taken to mitigate any harm caused or threatened by the event; and the measures taken and to be taken to prevent the reoccurrence of such an event. Regardless of whether or not such a report is made to MDNR, if MDNR determines that activities of the Respondents in compliance or noncompliance with this Order have caused or may cause a release of a hazardous substance, pollutant or contaminant or a threat

to the public health or welfare or to the environment, MDNR may (a) order the Respondents to stop further implementation of this Order for such period of time as may be needed to abate such release or threat; and/or (b) undertake any action which MDNR determines is necessary to abate such a release or threat.

23. Health and Safety Compliance and Quality Assurance/Quality Control: The Respondents shall use quality assurance, quality control, and chain of custody procedures described in the "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plan," December 1980, QAMS-005/80, and subsequent amendments to such guidelines, while conducting all sample collection and analysis activities required by this Order. To provide quality assurance and maintain quality control, the Respondent(s) shall submit a Quality Assurance Project Plan to MDNR consistent with the requirements, guidance, and schedule contained in the Statement of Work and comply with the approved Quality Assurance Project Plan. The Respondents also shall prepare a Health and Safety Plan as required and described in the Statement of Work. The accepted Health and Safety Plan shall be consistent with and implement standards promulgated by the Secretary of Labor pursuant to Section 126 of CERCLA and Section 6 of the Occupational Health and Safety Act of 1970.

24. Availability of RI/FS Data: The Respondents shall submit in their monthly progress reports (Progress Reports), as described in Paragraph 33 of this Order, a summary of results of all sampling and/or tests and all other data generated by the Respondents, by their Contractor, or on the Respondents' behalf, in the course of implementation of the Order or otherwise. The full results and any underlying documentation shall be furnished to MDNR upon request.

25. Split Sampling: At the request of MDNR, the Respondents shall provide split or duplicate samples to MDNR and/or their authorized representatives, of any samples collected by the Respondents pursuant to the implementation of this Order. Similarly, the Respondents shall allow such split or duplicate samples to be taken by MDNR and/or their authorized representatives. The Respondents shall notify MDNR not less than four (4) weeks in advance of any sample collection activity. Not less than three weeks in advance of sample collection, the Respondents shall notify MDNR of the sampling date, sampling media, the number of samples from each media unless MDNR specifies a different time period. In the event that MDNR or its authorized representative engages in sample collection activity, the Respondents may, upon request, obtain splits or duplicates of such sample collection activity.

26. Record Preservation: The Respondents shall preserve, during the pendency of this Order, and for a period of not less than six (6) years after completion of work under this Order, all records and documents in their possession or in the possession of their employees, agents, officials, authorized representatives, accountants, contractors, attorneys, successors or assigns, and parent companies, which relate in any way to the site or to implementation of this Order, notwithstanding any document retention policy to the contrary. The Respondents must receive written permission from the MDNR prior to the destruction of any such documents, which permission shall not be unreasonably withheld. A request to destroy any such documents shall be accompanied by a copy of this Order and shall be sent to the following address:

Assistant Attorney General In Charge
Michigan Department of Attorney General
P.O. Box 30212
Lansing, Michigan 48909

Upon request by MDNR, Respondents shall make available to EPA any or all such records and documents or copies of any such records and documents.

27. Place and Manner of Notice: Communications between the Respondents and MDNR, and all documents, including reports, approvals, disapprovals, written notice, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the Respondents' Project Coordinator, and the MDNR PM. For each deliverable document provided to MDNR, five copies and one camera ready original shall be submitted to MDNR unless otherwise requested by MDNR. All such documents submitted pursuant to this Order shall be sent by certified mail, return receipt requested, or by courier, to the MDNR PM, at the following addresses or to such other addresses as MDNR hereafter may designate in writing:

Scott Cornelius
Environmental Response Division
Department of Natural Resources
Knapp's Centre
P.O. Box 30028
Lansing, Michigan 48909

28. Necessity of Formal Approval: No informal advice, guidance, suggestions or comments by MDNR regarding reports, plans, specifications, schedules, or any other writing submitted by the Respondents shall be construed as relieving the Respondents of their obligations to obtain such formal reviews as may be required by this Order.

29. Procedure for Submission of Plans, Deliverables and Reports to MDNR: All plans, deliverables and reports identified in the Statement of Work or the MDNR approved Work Plan for submittal to MDNR shall be so delivered to MDNR in accordance with the schedule set forth in Appendix 1 or otherwise established under this Order. Prior to receipt of MDNR approval, any report submitted to MDNR for approval shall be marked "Draft" on each page and shall include, in a prominent location in the document, the following disclaimer: "Disclaimer: This document is a DRAFT document prepared by the Respondents pursuant to a government Administrative Order which has not received final acceptance from the Michigan Department of Natural Resources. The opinions, findings, and conclusions expressed are those of the authors and not those of the Michigan Department of Natural Resources."

30. Procedure for Review, Revision, and Approval of Deliverables: MDNR will review the deliverables required by this Order to determine whether they are consistent with the requirements of Appendix 1 and the Order and will respond to Respondents with one of four findings:

- A. Approval—which means that Respondents shall proceed with the next scheduled RI/FS activity consistent with the deliverable.

- B. Approval with Conditions--which means that Respondents, unless they invoke dispute resolution under paragraph 36 of this order, shall proceed with the next scheduled RI/FS activity, subject to certain required modifications or conditions set forth in MDNR comments.
- C. Disapproval with Modification Required--which means that the Respondents, unless they invoke dispute resolution under paragraph 36 of this order, shall modify the deliverable to correct the noted deficiencies and resubmit the deliverable consistent with MDNR's comments for further review. Modifications may be required in any original submitted deliverable, any portions of a deliverable, or any deliverable or portion of deliverable resubmitted to MDNR. MDNR will specify a schedule for resubmitting deliverables requiring modifications.
- D. Disapproval with MDNR modification--which means that MDNR has determined that it will modify the submission to cure any deficiencies and/or undertake the RI/FS or any portion of the RI/FS. In either case MDNR will recover costs of such modification or work from the Respondents as an oversight cost.

A finding of Approval or Approval with Conditions shall not be construed to mean that MDNR concurs with all conclusions, methods or statements in the deliverables.

31. Incorporation of Deliverables into Consent Order: Any reports, plans, specifications, schedules, and attachments or other deliverables required by this Order are incorporated in to this Order. Any delay or non-compliance with such reports, plans, specifications, schedules, and attachments or other deliverables shall be considered delay or non-compliance with requirements of this Order and shall subject the Respondents to penalties pursuant to Paragraph 37 or 38.

32. Excuses for Delays in Performance: With respect to the Respondents' compliance with any interim or final time deadline set forth in this Order, no stipulated penalties or other sanctions will be imposed for delay directly caused by the following which could not have been overcome by the Respondents' due diligence: (i) an act of God; (ii) any delay caused from the public review and comment process as provided in the Work Plan and this Order; (iii) any other cause entirely beyond the control of the Respondents; provided, however, that increases in the cost of performance of the RI/FS shall not excuse such performance nor affect the applicability of the penalty provisions or other sanctions which are provided for under this Order. Such penalties and sanctions shall be avoided only if, and only to the extent that, delays directly caused by conditions specified in (i) through (iii) above materially interfered with or prevented the Respondents' execution of their responsibilities during the period of such delay. The Respondents shall notify MDNR within forty-eight (48) hours in the event that circumstances occur which the Respondents assert should trigger the excuse provisions of this Paragraph, and shall identify with specificity the cause of such delay and the estimated duration of such delay. Within five (5) working days after Respondents first became aware of such circumstances, Respondents shall supply to MDNR in writing an explanation of the cause(s) of any actual or expected delay or noncompliance, the anticipated duration of any delay, the measures

taken and to be taken by Respondents to prevent or minimize the delay or correct the noncompliance, and the timetable for implementation of such measures. Failure to notify MDNR shall result in a waiver of the Respondents' right to assert that the delay should be excused under the terms of this Paragraph. The Respondents further agree to use their best efforts to minimize any delay which may result. The Respondents acknowledge that they will have the burden of justifying excuses for delay in performance under this Paragraph. MDNR will, if appropriate, modify or extend the terms of this Order to accommodate excusable delay pursuant to the provisions of this Paragraph. An extension of one compliance date based upon a particular event does not necessarily mean that Respondents qualify for an extension of a subsequent compliance date without establishing excusable delay.

33. Monthly Progress Reports: The Respondents shall provide monthly written progress reports (Progress Reports) to MDNR. At a minimum, these Progress Reports shall describe the progress made during the preceding month by: (1) describing the actions which have been taken toward achieving compliance with this Order; (2) summarizing all the results of sampling and tests and all other data received by the Respondents; (3) describing actions, data, plans, and procedures which are scheduled for the next month. Progress Reports shall be submitted to the MDNR PM by the twenty-first (21st) day of each month following the last day of the reporting period, beginning after the effective date of this Order. Meetings between the MDNR PM/assistant PMs and the Contractor shall be held at least once per month at the MDNR office in Lansing, unless MDNR determines another location or that a monthly meeting is not required for a particular month. The Respondents and the Contractor engaged to perform work under this Order shall also meet with and make formal presentations to MDNR at the completion of major components of the RI/FS, as specified by the MDNR PM.

34. Public Review of FS Report: When MDNR determines the FS Report required under this Order is acceptable for public review, the FS Report shall be made available by MDNR for public comment for a period of not less than twenty-one (21) days. The dates and length of the public comment period shall be established by MDNR. Following the public review and comment period, MDNR may refer the FS Report back to the Respondents for revision pursuant to public comments and MDNR comments. In addition, the Respondents shall provide information for the Responsiveness Summary as requested by MDNR. MDNR will prepare the final Responsiveness Summary for the RI/FS.

35. Modification of Order: This Order, with the exception of Appendix 1 or deliverables thereunder, may only be modified upon the written agreement of MDNR, by signature of the Director of MDNR, and the Respondents Project Coordinator. Appendix 1 or any accepted deliverables may be modified upon signature of the SC of MDNR.

36. Dispute Resolution: If the Respondents object to any MDNR notice of disapproval or decision made pursuant to this Order, the Respondents shall notify MDNR in writing of its objections within fifteen (15) working days of receipt of the notice. MDNR and the Respondents shall have fifteen (15) days from the receipt by MDNR of the notification of objection to reach agreement. If agreement cannot be reached on any issue within this fifteen (15) day period, MDNR shall provide a written statement of its decision to the Respondents and the Respondents shall implement the activities required by the

MDNR decision beginning no later than fifteen (15) days after receipt of the MDNR statement. In the event that the Respondents do not implement the activities required by the MDNR decision, the MDNR with the assistance of the Attorney General may take such civil enforcement actions against the Respondents as may be provided by statutory or equitable authorities, including but not limited to, the assessment of civil penalties or damages. In such an event, MDNR retains the right to perform additional studies, and to conduct a partial or complete Remedial Investigation/Feasibility Study and to recover the costs thereof from the Respondents. Engagement of a dispute resolution among the parties shall not be cause for the delay of any work.

37. Stipulated Penalties for Delay in Performance of Major Deliverables: For each day that the Respondents fail to complete a major deliverable identified in the SOW or to comply with any time deadline for any major deliverable established pursuant to this Order, the Respondents, collectively, shall pay the sums set forth below as stipulated penalties:

<u>Period of Failure to Comply</u>	<u>Penalty Per Day</u>
1st - 5th day	\$ 250.00
6th - 15th day	\$ 500.00
each day thereafter	\$4,500.00

Penalties begin to accrue on the day after performance is due, and extend through until the violation is corrected. Stipulated penalties shall accrue during any dispute resolution, except to the extent that Respondents prevail with respect to disputed penalties. If MDNR demands stipulated penalties from the Respondents pursuant to Paragraph 39 of this Order for a failure to meet a

compliance deadline set out in this Paragraph or Paragraph 38, MDNR shall not demand stipulated penalties for the Respondents' failure to comply with a subsequent compliance deadline if the Respondents have made a good faith effort to meet the subsequent deadline but have not been able to do so as a result of their failure to meet the original deadline for which penalties have been paid in full.

38. Stipulated Penalties of Other Delays in Performance: For each day that the Respondents fail to comply with any deadline established pursuant to this Order other than a deadline governed by Paragraph 37 hereto, stipulated penalties in the amount of five hundred (500) dollars per day shall accrue on the day after performance is due, and extend through until the violation is corrected.

39. Any penalty accruing under Paragraph 37 and 38 shall be due and payable within ten (10) days of the receipt of a written demand by MDNR. Payment of such penalty shall be made by certified check payable to the State of Michigan, and mailed to the following address with a notation of the Site and docket number of this Order:

Assistant Attorney General In Charge
Michigan Department of Attorney General
P.O. Box 30212
Lansing, Michigan 48909

A copy of the certified check shall be sent to the MDNR PM within five (5) days of payment. The stipulated penalties set forth in this Paragraph do not preclude MDNR from electing to pursue any other remedies or sanctions which may be available to MDNR by reason of the Respondents' violation of this Order or the Respondents' failure or refusal to comply with any of the requirements of this Order. Such remedies and sanctions include, but are not limited to, suit for penalties, damages, and injunctive relief, and for reimbursement of costs incurred by the State.

40. Civil Penalties for Non-Compliance: Pursuant to Section 10 of WRCA, the Respondents are advised that if they violate, fail, or refuse to comply with this Order, or any portion thereof, the Respondents may be subject to civil fine of not less than \$2,500, nor more than \$25,000 for each day in which such violation occurs. The Respondents reserve all rights they have to defend against and oppose any such claim by MDNR for additional monetary relief.

41. Indemnification: The Respondents agree to indemnify and save and hold harmless the State of Michigan, its agencies, departments, agents, offices, employees and representatives from any and all claims or causes of action arising from or on account of acts or omissions of the Respondent(s), its agents, successors, and assignees in carrying out the activities pursuant to this Order, except to the extent that an act or omission was directed by MDNR over the Respondents' objection after dispute resolution.

42. Certification of the Respondents' Performance of the Work Activities: Upon issuance of the Record of Decision, MDNR shall determine if the Respondents have met all of their responsibilities under Appendix 1 [Statement of Work], and under the provisions of the Order, including payment of oversight costs and any stipulated penalties or other penalties or damages that the Respondents may have incurred during the course of their activities under the Order. If MDNR determines that such responsibilities have been satisfied, MDNR will, after issuance of the final Record of Decision for the Site, certify to the Respondents that their responsibilities under the Statement of Work, the Work Plan and this Order have been completely and successfully discharged.

43. Covenant Not to Sue: Upon certification by MDNR that the Respondents have completed the RI/FS in accordance with this Order, MDNR covenants not to sue the Respondents for completion of the RI/FS covered by the signed Record of Decision. This covenant not to sue shall not take effect and shall be rendered null and void in the event that the Respondents fail to make all of the payments required of them by this Order. Respondents are not released from liability, if any, for any actions taken beyond the terms of this Order or activities arising pursuant to Section 121(c) of CERCLA.

44. Reservation of Rights: MDNR reserves the right to bring an action against the Respondents under CERCLA and State law for recovery of all past response costs incurred by the State of Michigan at the Site not reimbursed by the Respondents, any costs incurred in the event that MDNR performs all or a portion of the RI/FS, as well as any future costs incurred by the State of Michigan in connection with response activities conducted under CERCLA or State law at this Site. The State expressly reserves any and all rights and defenses that it may have to enforce this Order against the Respondents, including MDNR's right both to disapprove of work performed by the Respondents

and to require that the Respondents perform tasks in addition to those detailed in this Order. In addition, MDNR reserves the right to undertake actions, including removal and/or remedial actions at any time and to perform any and all portions of the RI/FS which the Respondents fail to perform to MDNR's satisfaction. Issuance of this Order shall not affect or limit in any way any rights which the State may have in relation to any liabilities or obligations which the Respondents or other persons may be subject to under CERCLA or other laws by virtue of any connections that the Respondents or those other persons have or may have had with the Site. The State reserves any and all rights to take any enforcement action pursuant to CERCLA, and/or any other available legal authority, including the right to seek injunctive relief, response costs, monetary penalties and punitive damages for any violation of law or this Order. This Order does not constitute any decision on preauthorization of funds.

45. Other Claims: Nothing in this Order shall constitute or be construed as a release or covenant not to sue regarding any claim, cause of action, or demand in law or equity against any person, firm, trust, trustee, joint venture, partnership, corporation, or other entity, for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Site. The State of Michigan shall not be liable for any injuries or damages to persons or property resulting from acts or omissions of the Respondents in carrying out the activities pursuant to this Order, nor shall the State of Michigan be held out as a party to, or in any other way be held liable under, any contract entered into by the Respondents or by the Contractor in carrying out the activities pursuant to this Order. This Order shall not estop or limit any legal or equitable claims of the State of Michigan against the Respondents, their agents, contractors, or assigns, including but not limited to, claims related to releases of hazardous substances or other pollutants or contaminants. Respondents further waive all other statutory and common law claims against the State of Michigan for costs of conducting the RI/FS, including, but not limited to, contribution and counterclaims for such costs. Respondents agree to withhold any judicial challenge relating to or arising out of the performance of this Order until after issuance of a final Record of Decision. The parties further agree that the provisions of Section 113 of CERCLA apply to the timing and manner of any judicial review.

46. Other Laws: All actions required to be taken pursuant to this Order shall be undertaken in accordance with the requirements of all applicable or relevant and appropriate State and Federal laws and regulations, including CERCLA; laws relating to occupational safety and health; and other Federal and State environmental laws as defined in EPA and State policy in effect at the time of the signing of the ROD. Other agencies, including the Occupational Safety and Health Administration (hereinafter the OSHA) and the Fish and Wildlife Service (hereinafter the FWS), may be called upon to review the conduct of work under this Order.

47. Use of Resource Conservation and Recovery Act Facilities: All facilities used by the Respondents for the off-site transfer, treatment, storage or

disposal of hazardous substances removed from the Site must be in compliance with the applicable requirement of the Resource Conservation and Recovery Act (RCRA), as amended, and the Michigan Hazardous Waste Management Act, 1979 P.A. 64, MCL 299.501, as amended. The Respondents are responsible for complying with these requirements including fulfilling the standards applicable to generators of hazardous waste, found at 40 C.F.R. Part 262 and 299.9101 et seq.. In particular, this responsibility includes using and signing manifest forms for hazardous waste leaving the Site. Further, the Respondents must designate, in a report to MDNR, any facilities that the Respondents propose to use for such off-site transfer, storage, treatment or disposal; and MDNR must approve the use of such proposed facilities.

48. Notice to the Federal Natural Resource Trustees: Pursuant to Section 122(j) of CERCLA, MDNR has notified the Federal Natural Resource Trustees of the scope of the response action, the negotiations with the potentially responsible parties, and of the issuance of this Order.

49. Community Relations: MDNR shall be responsible for preparing a Community Relations Plan and conducting a community relations program. The Respondents and the Contractor engaged to conduct the RI/FS under this Order shall, consistent with the Community Relations Plan, attend and participate in public meetings regarding the Site, to the extent specified by the MDNR PM; prepare fact sheets concerning the Site and activities conducted under this Order for submission to the MDNR PM; and provide timely and appropriate responses to inquiries from the public at the request of the MDNR PM.

50. Separate Documents: This Order may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

51. Effective Date: Final acceptance of this Order by MDNR shall be subject to the publication of the proposed settlement and the opportunity for comments for persons who are not parties to the proposed settlement, and consideration of comments in determining whether to consent to the proposed settlement. After consideration of any comments submitted during a thirty (30) day public comment period, MDNR may withdraw consent to this Order if comments received disclose facts or considerations which indicate that this Order is inappropriate, improper or inadequate. Otherwise, MDNR may execute this Order after consideration of such comments. This Order shall be effective upon the date that the Respondents receive notice that the MDNR Director has signed the Order. All times for performance of activities under this Order shall be calculated from that date.

[Appendix 1: Statement of Work]

**STATEMENT OF WORK
REMEDIAL INVESTIGATION**

**ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
KALAMAZOO AND ALLEGAN COUNTIES**

PURPOSE

The purpose of this remedial investigation is to determine the nature and extent of the contamination at the site and to gather all necessary data to support the feasibility study. The Respondents will furnish all personnel, materials, and services necessary for, or incidental to, performing the remedial investigation at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, hereinafter referred to as the "Site".

The surface water, groundwater, soils, and sediment remedial investigations will focus on the Bryant Mill Pond, Portage Creek, and downstream on the Kalamazoo River to the Allegan City Dam. The scope of the study will also include a soil and groundwater contamination investigation on Performance Paper property south of Alcott Street, and at other facilities currently or previously owned, operated, or leased by respondents which are contiguous to the NPL Site where soil or groundwater contamination exists or is discovered during the course of the RI/FS or design and construction phases.

SCOPE

The remedial investigation consists of eight tasks:

- Task 1 - Description of Current Situation
- Task 2 - Plans and Management
- Task 3 - Site Investigations
- Task 4 - Preliminary Remedial Technologies
- Task 5 - Site Investigation Analyses
- Task 6 - Remedial Investigation Report
- Task 7 - Community Relations Support
- Task 8 - Additional Requirements

TASK 1 - DESCRIPTION OF CURRENT SITUATION

The Respondents shall review and assess the current site conditions, site history and the nature of response actions taken to date. This task will outline the purpose of the Remedial Investigation (RI) and will be conducted concurrently with Task 2. The data gathered during previous investigations or inspections and other relevant data should be used whenever practicable.

a. Site Background

Prepare a summary of the regional location, pertinent area boundary features, a general site physiography, hydrology, and geology. The total area of the site will be defined, as well as the general nature of the problem, including pertinent history relative to the use of the site for hazardous waste disposal and their interrelations.

b. Nature and Extent of Problem

Prepare a summary of the actual and potential on-site and off-site health and environmental effects. This may include, but is not limited to, the type, physical state, and amounts of hazardous substances, the existence and conditions of landfills, excavation depths, base grades, amount of fill, affected media and pathways of exposure, contaminated releases such as leachate or runoff, the existence and condition of drums, lagoons, tanks and other containers, and any human exposure associated with Respondents' properties. Describe any reports of human or animal related illnesses that may be related to the Site. Emphasis should be placed on describing the threat or potential threat to public health. Data from previous site work and reports should be summarized with references listed.

c. History of Response Actions

Prepare a summary of any publicly available previous response actions conducted by Federal, State, local or private parties. This summary shall include site inspections, sample surveys, cleanup activities and other technical investigations. This summary shall also address any legal activities undertaken by Respondents or private citizens including suits, PRP searches, etc. A list of documents prepared pursuant to the above activities, including survey reports, sampling results, public legal records, etc., and their physical locations shall be included.

d. Define Boundary Conditions

Establish site boundary conditions to limit the areas of site investigations. The boundary conditions should be set so that subsequent investigations will cover the contaminated media in sufficient detail to support the following activities (e.g., the feasibility study). The boundary conditions may also be used to identify boundaries for site access control and site security.

e. Site Facilities

The Respondents will establish a site office in a safe, secure area, to support all field activities. It will be located in close vicinity to parking with adequate capacity for Federal and State employees. Sanitary facilities will be provided in close vicinity to the office that are readily accessible to all field staff and visitors. The site office will have a telephone with long distance service to support activities by State and Federal employees, their agents and representatives, including contractors. The site office and supporting facilities, including but not limited to decontamination facilities, will be established in accordance with the site Health and Safety Plan.

TASK 2 - PLANS AND MANAGEMENT

Prepare all necessary plans for the remedial investigation. The plans should include a detailed discussion of the technical approach, personnel requirements, and schedules, as well as the following:

a. Work Plan

Develop a detailed work plan for carrying out a RI/FS. This plan shall describe in detail all studies to be conducted including a statement of sampling objectives, specification of equipment, analyses of interest, sample types, and sample locations and frequency, and schedule. The plan

must address all levels of the investigations as well as all types of investigations considered. Consideration should be given to the use of field screening techniques to screen out the samples that do not require off-site laboratory analysis. The plan will identify associated data that may be needed to evaluate alternatives for the feasibility study. The Work Plan will be revised, if necessary, to address problems or issues that occur as a result of new information gathered during the RI/FS. Site maps, with corresponding grid systems, will be prepared as necessary.

b. Quality Assurance Project Plan (QAPP)

Prepare and submit for MDNR approval a plan detailing the collection, handling, custody, transport and analysis of samples and data collected during the course of the remedial investigation. The plan shall assure that the analytical results can be used in any legal proceedings and are consistent with State and Federal guidelines. The plan can be referenced as needed throughout the project to reflect changes in the sampling program, documentation requirements or additional information gathered during the course of the project.

The QAPP will be submitted to and approved by the Michigan Department of Natural Resources (MDNR) prior to the start of the Remedial Investigation at the Site. The purpose of the QAPP is to ensure that formal procedures are available for all activities affecting the quality of data collected.

The QAPP will be prepared according to the guidelines in, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" (QAMS-005/80), U.S. EPA, 29 December 1980, including the following:

1. Title page with provisions for approval signatures,
2. Table of Contents,
3. Project description,
4. Project Quality Assurance (QA) organization and responsibility,
5. QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness and comparability for each parameter,
6. Sampling procedures,
7. Chain of custody procedures,
8. Calibration procedures and frequency,
9. Analytical procedures, including methods verification and standard operating procedures,
10. Data reduction, validation and reporting,
11. Internal quality control checks and frequency,
12. Performance and system audits and frequency,
13. Preventive maintenance procedures and schedules,
14. Specific routine procedures to be used to assess data precision, accuracy, and completeness of specific measurement parameters involved,
15. Corrective action, and
16. Quality assurance reports to management.

c. Quality Assurance/Quality Control (QA/QC) Review of Historical Studies and Data

Develop a plan for a QA/QC review of existing data and studies. In order to incorporate the data into the RI/FS the Respondents are responsible for obtaining written approval from the MDNR that such data can be used and incorporated into the RI/FS.

d. Data Management Plan

A Data Management Plan shall be developed and initiated to document and track investigation data and results. The plan should identify and set up laboratory and data documentation materials and procedures, project file requirements, and project-related progress.

e. Health and Safety Plan (HSP)

The health and safety of site workers is the responsibility of the Respondents. A Health and Safety Plan shall be submitted to the MDNR for review prior to the start of the Remedial Investigation. The purpose of the HSP is to assure that qualified personnel will be conducting the Remedial Investigation and to minimize the risks to personnel from chemical and physical hazards during the course of work. The plan will be consistent with:

- * EPA Interim Standard Operating Safety Guide (September, 1982) and with applicable OSHA standards
- * Section 111(c)(6) of CERCLA
- * EPA Order 1440.2 - Health and Safety Requirements for Employees Engaged in Field Activities
- * EPA Order 1440.3 - Respiratory Protection
- * EPA Occupational Health and Safety Manual
- * Other EPA guidance as provided
- * State safety and health statutes including MIOSEA
- * Site conditions

Guidance for preparation of a Health and Safety Plan may be found in "Standard Operating Safety Guides," November, 1984, as amended.

The HSP should include, at a minimum, the following items:

- * Minimum training and medical requirements for on-site personnel,
- * Health and safety responsibilities,
- * Work zone definitions,
- * General work rules,
- * Contingency plans in case of accident or injury,
- * Environmental monitoring and sampling procedures, interpretation and response,
- * Decontamination procedures for personnel and equipment,
- * Health related information for identified chemicals of concern,
- * Site security measures, and
- * Procedures for protecting third parties, such as visitors or the surrounding community.

f. Community Relations Plan

The MDNR will prepare a plan addressing community relations in a manner consistent with Task 7, and submit the plan to Respondents for review.

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g. Plan for Satisfaction of Permitting Requirements

Prepare a plan addressing any Federal or State permitting requirements to be addressed as part of the RI.

h. ATSDR Health Assessment

The Work Plan for the Site shall also provide for collection of adequate information to support an Agency Toxic Substances and Disease Registry (ATSDR) Health Assessment which is required by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Since the Health Assessment will be prepared by ATSDR, all draft Work Plans and support documents should be submitted for ATSDR review and comment to ensure that their needs and requirements are being met. In the event that the Health Assessment has already been completed by ATSDR, the RI report should include and address the findings of that report.

TASK 3 - SITE INVESTIGATIONS

The Respondents shall conduct those site remedial investigations necessary to characterize the Site and the actual or potential hazard to public health and the environment. The site investigations will also result in data of adequate technical content to assess preliminary remedial alternatives developed in Task 4 and support the detailed evaluation of alternatives during the feasibility study.

The goals of the site investigation are:

- * Fully characterize the chemical nature of the wastes at the Site;
- * Define any identifiable contaminant sources at the Site;
- * Determine the vertical and horizontal extent of contamination originating at the Site;
- * Spatially quantify contamination to the extent necessary to enable preparation of an Endangerment Assessment and a FS, and to the extent that such contamination may be attributable to the Site;
- * Identify contaminant migration pathways and movement; and
- * Quantify public health and environmental risk.

The site investigation activities will follow the plans set forth in the Work Plan. All sample analyses will be conducted at laboratories following EPA protocols or their equivalents. Strict chain-of-custody procedures will be followed and all sample locations will be identified on the site maps and grid systems as part of the Work Plan.

The MDNR believes the subtasks listed below are consistent with satisfying the goals above. The Work Plan may propose alternate methods of achieving the goals of the Site Investigation. If MDNR determines a proposed alternate method meets the purposes and requirements of this SOW in replacement of the original, the replacement method will be used. MDNR retains approval authority over the initial Work Plan and any additions or modifications thereto.

a. Waste Characterization

Conduct a sampling and analysis program to characterize all material of interest on the Respondents' properties, and other areas of concern which may become evident during the study. These materials should include

wastes stored above or below ground in tanks, drums, lagoons and other surface water bodies, piles, known disposal areas, spill locations and other similar areas. Efforts should begin with a survey of existing documents and any other data relating to types of waste materials at the Site, and previous sampling episodes performed and their results. A plan shall be developed describing how the characterization will be performed. The characterization should support any subsequent conclusions about developing preliminary remedial alternatives.

Additional sampling may be required should the available information be insufficient to fully characterize the waste materials. The Field Sampling Plan and QAPP will need to describe the sampling analysis techniques appropriate to the site condition.

The number of samples needed to obtain representative data will also be discussed. Elements of the HSP and the QAPP will also apply to sampling.

b. Hydrogeological Investigation

As applicable, develop and conduct a program to determine the nature and vertical and horizontal extent of groundwater contamination in all aquifers, local and regional hydrogeological conditions, groundwater flow rate and direction, attenuation capacity, discharge/recharge areas and effects of ongoing or known potential remedial action(s), mobility of pollutants, soils attenuation capacity and mechanisms. Such information may be available from the USGS, the Soil Conservation Service, and local well drillers.

Subsequent to the survey of existing data, a sampling program should be developed to determine the horizontal and vertical distribution of contaminants. The sampling program may include, but is not limited to, the evaluation of factors affecting groundwater hydrology, such as groundwater flow direction and existence of fractured bedrock conditions, existence of groundwater mounds, divides or old river channels, thickness of the aquifer(s), and interconnection between aquifers. Cross-section diagrams and contour maps must be drawn. The following must also be included in the sampling program in accordance with the QAPP: determination of upgradient levels of contaminants within the sand and gravel aquifer and within the bedrock aquifer (if appropriate), the type of well construction utilized (must be compatible with contaminants encountered); the number and location of wells, chain of custody and record of samples, and the groundwater sampling method.

Geophysical techniques should be considered for use in defining subsurface conditions and design of the sampling program. The investigation shall also assess whether municipal, private, and/or industrial wells in the vicinity could be affected by contaminants from the Site. In addition, the suitability for on-site temporary storage and staging of waste prior to final remedy is to be evaluated. The Respondents will consider using a close support lab with the capability for the quick quantitative screening of water, soil gas, and soil samples with a portable gas chromatograph (GC). Respondents will describe in the Work Plan and Sampling Plan the types of samples that would be run on the GC. Procedures for operating the chromatograph would also be contained in the QAPP.

c. Soils and Sediments Investigation

Develop and conduct a sampling program to determine the nature and vertical and horizontal extent of contamination of surface and subsurface soils and sediments. This subtask may overlap with the hydrogeologic study (e.g., characteristics of soil strata are relevant to both the transport of contaminants in the soil; cores from groundwater monitoring wells may serve as soil samples).

Information regarding local background levels, location of samples, techniques utilized, and methods of analysis should be used to identify the locations and probable quantities of subsurface wastes. This work will be in accordance with the QAPP, the Work Plan, and the Field Sampling Plan.

d. Air Investigation

As applicable, conduct a program to determine the extent of atmospheric contamination. The program would address the tendency of the substances identified through the waste characterization to enter the atmosphere, and local wind patterns. Any work will follow the specifications of the QAPP, the Work Plan, and the Field Sampling Plan.

e. Surface Water Contamination

Conduct a program to determine the extent and nature of surface water contamination at the Site.

f. Biota Contamination

Conduct a program to identify the nature and extent of contamination in biota at the Site.

g. Technical Memoranda

The Respondents shall submit technical memoranda to the MDNR for subtasks within Task 3. The technical memoranda will include:

- * Description of the subject activities
- * A plot of actual sampling locations along with corresponding sample numbers
- * All sample identification information
- * Photocopies of all pertinent field notes
- * Description of geology and hydrology
- * Soil gas concentrations and analyses, if appropriate
- * Soil, sediment, biota, and water analysis
- * Water quality during drilling
- * Contaminant concentration profiles
- * Preliminary findings

These technical memoranda are to be submitted after completion of validation of laboratory data. Five (5) copies should be sent to MDNR.

TASK 4 - PRELIMINARY REMEDIAL TECHNOLOGIES

The Respondents will identify preliminary remedial technologies, providing detail sufficient to ensure that site investigations will develop a data base adequate for the evaluation of alternatives during the feasibility study.

a. Pre-Investigation Action

Prior to collecting additional data, the Respondents will assess the site conditions to determine potential categories of source control and/or off-site remedial actions. Criteria for off-site remedial actions can be found in EPA Interim Policy: "Procedures for Planning and Implementing Off-Site Response Actions" (50 Federal Register 45933, Nov. 5, 1985). Examples of questions to be answered are:

1. Source Control Action

- i. What containment techniques appear feasible to prevent contamination of ground water, surface water, and biota?
- ii. Does incineration or reclamation appear to be a viable option?
- iii. Does on-site treatment appear to be a viable option, and if so, what category of treatment should be investigated (e.g., biological, physical, chemical, thermal)?
- iv. Will substances migrate or continue to migrate off-site if no action is taken? If only source control measures are taken?
- v. Does the apparent volume of contaminated surface water, ground water, soil, or sediment make investigation or treatment impracticable?
- vi. What technologies are available to treat the identified contaminants at the site?

The MDNR will review and screen the preliminary technologies so that the site investigation can be designed to answer these types of questions and support the feasibility study.

b. Post-Investigation Evaluation

Either during or following the site investigations the Respondents will assess the investigation results and recommend preliminary remedial technologies likely to apply to the site problem. These technologies should be a refinement of the options considered in Task 4a. They will provide the basis for developing detailed alternatives during the feasibility study. The work during the remedial investigation will generally be limited to the following:

1. Recommending types of remedial technologies appropriate to the site conditions.
2. Recommending whether or not to remove some or all of the waste for off-site treatment, storage, or disposal.
3. Determining the compatibility of groups of wastes with other wastes and with materials considered as part of potential remedial action (e.g., slurry walls, lagoon liners). Recommending alternatives for treatment, storage, or disposal for each category of compatible waste.

TASK 5 - SITE INVESTIGATIONS ANALYSIS

The Respondents shall prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality and quantity to support the feasibility study. The summary shall be presented to the MDNR as a draft remedial investigation report. Comments on the draft will be addressed in the final document.

The results and data from all site investigations must be organized and presented logically so that the relationships between site investigations for each medium are apparent.

a. Data Analysis

Analyze all site investigation data and develop a summary of the type and extent of contamination at the Site. The summary should describe the quantities and concentration of a specific chemical at the Site and ambient levels surrounding the Site. Also describe the number, location, and types of nearby populations, activities and pathways that may result in an actual or potential threat to public health, welfare, or the environment.

b. Application to Preliminary Technologies

Analyze the results of the site investigations in relation to the preliminary remedial technologies developed in Task 4. Data supporting, or rejecting, types of remedial technologies, compatibility of wastes and construction materials, and other conclusions will be presented.

TASK 6 - REMEDIAL INVESTIGATIONS REPORTS

The Respondents shall prepare a draft report covering the remedial investigation phase and submit five (5) copies to MDNR.

The draft report shall include the results of Task 1 through 5, and should include additional information in an appendix. The report shall be structured to enable the reader to cross-reference with ease. Comments from the MDNR will be incorporated into the Final RI Report, of which copies shall be submitted to the MDNR as mentioned above.

TASK 7 - COMMUNITY RELATIONS SUPPORT

A Community Relations Plan for the Site is required and will be prepared by MDNR. The plan will describe the history of community concern at this site, and identify proposed community relations activities to be implemented during the Remedial Investigation and Feasibility Study. MDNR will provide Respondents with the opportunity to review the plan prior to its implementation.

The Respondents may be required to furnish the personnel, services, materials and equipment required to undertake a community relations program. Although this may be a limited program, community relations must be integrated closely with all remedial response activities. The objectives of this effort are to achieve community understanding of the actions taken and to obtain community input and support prior to selection of the remedial alternative(s).

TASK 8 - ADDITIONAL REQUIREMENTS

a. Reporting Requirements

In addition to such task reports required by MDNR, monthly reports shall be prepared by the Contractor to describe the technical progress of the project. These reports should discuss the following items:

1. Identification of site activities taken toward achieving compliance with the Administrative Order.
2. Status of work at the site and progress to date, including all sampling and tests and all other raw data produced during the reporting period.
3. Percentage of completion.
4. Difficulties encountered during the reporting period.
5. Actions being taken to rectify problems.
6. Activities planned for the next month.
7. Changes in personnel.

The monthly progress report will list target and actual completion dates for each element of activity including project completion and provide an explanation if any deviation from the milestones in the work plan schedule.

The Monthly Work Assignment Status Report (Technical) will meet the above requirements. Five (5) copies should be sent to MDNR.

**STATEMENT OF WORK
FEASIBILITY STUDY**

**ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
KALAMAZOO AND ALLEGAN COUNTIES**

PURPOSE

The purpose of this remedial action feasibility study is to develop and evaluate remedial alternatives for the Allied Paper, Inc./Portage Creek/Kalamazoo River Site. The Respondents shall furnish the necessary personnel, materials and services required to prepare the remedial action feasibility study, except as otherwise specified herein.

SCOPE

The feasibility study consists of seven tasks:

- Task 9 - Description of Current Situation and Proposed Response
- Task 10 - Development of Alternatives
- Task 11 - Initial Screening of Alternatives
- Task 12 - Laboratory Studies
- Task 13 - Evaluation of the Alternatives
- Task 14 - Reports
- Task 15 - Additional Requirements

A work plan that includes a detailed technical approach, personnel requirements, and schedules shall be submitted for the proposed feasibility study.

TASK 9 - DESCRIPTION OF CURRENT SITUATION AND PROPOSED RESPONSE

Information on the site background, the nature and extent of the problem, and previous response activities presented in Task 1 of the remedial investigation may be incorporated by reference. Any changes to the original project scope described in the Task 1 description should be discussed and justified based on results of the remedial investigation.

Following this summary of the current situation, a site-specific statement of purpose for the response, based on the results of the remedial investigation, should be presented. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by remedial alternatives.

TASK 10 - DEVELOPMENT OF ALTERNATIVES

Based on the results of the remedial investigation and consideration of preliminary remedial technologies (Task 4), the Respondents shall develop a limited number of alternatives for source control and/or off-site remedial actions on the basis of objectives established for the response and applicable agency policy.

The feasibility study will also be conducted in accordance with the Michigan Environmental Response Act (1982 P.A. 307) and rules promulgated under the Act.

a. Establishment of Remedial Response Objectives

Establish site-specific objectives for the response. These objectives will be based on public health and environmental concerns, the description of the current situation (from Task 1 and 9), information gathered during the remedial investigation, section 300.430 of the National Contingency Plan (NCP), 40 CFR 264.100, EPA's interim guidance, EPA's interim off-site policy, and the requirements of any other applicable Federal and/or State environmental standards guidance and advisories as defined under Section 121 of SARA and the Act 307. Preliminary clean-up objectives shall be developed in consultation with the MDNR.

b. Alternative Remedial Actions

Assemble combinations of identified technologies into alternative remedial actions. To the extent it is both feasible and appropriate, alternatives and other appropriate considerations should be developed into a comprehensive site specific approach. Alternatives are to be developed to include the following:

1. Treatment alternatives for source control that would eliminate the need for long-term management (including monitoring).
2. Alternatives involving treatment as principal element to reduce the toxicity, mobility or volume of waste at the Site.

c. Additional Alternatives

Develop additional alternatives:

1. An alternative that involves containment of waste with little or no treatment, but provides protection of human health and the environment primarily by preventing potential exposure or reducing the mobility of the waste.
2. A no action alternative.
3. Alternatives which also provide a performance range equivalent to Type A, B and C cleanups in accordance with P.A. 307 rules.

TASK 11 - INITIAL SCREENING OF ALTERNATIVES

A. Alternatives

The alternatives developed in Task 10 will be screened by the Respondents and the MDNR to eliminate alternatives that are clearly not feasible or appropriate prior to undertaking detailed evaluations of the remaining alternatives. The list of alternatives will be screened based on the NCP, the Act 307, and the rules promulgated under this Act.

B. Alternatives Array Document

Upon completion of Task 11A, the Respondents will develop applicable or relevant and appropriate requirements (ARARs) related to the remaining remedial alternatives. To facilitate this, an alternatives array document will be prepared by Respondents to summarize site description, technology identification and screening, and alternatives development and screening. The document will be submitted to MDNR, who will in turn distribute it to appropriate sections and/or agencies for review and identification of ARARs. As appropriate, MDNR will update the identified ARARs throughout the FS process.

TASK 12 - LABORATORY STUDIES

The Contractor shall conduct any necessary laboratory and bench scale treatability studies required to evaluate the effectiveness of remedial technologies and establish engineering criteria (e.g., leachate treatment, groundwater treatment, compatibility of waste/leachate with site barrier walls, cover, and other materials proposed for use in the remedy). It is expected that the scope of this task will depend on the results of Tasks 10 and 11, and the Endangerment Assessment. The Contractor will submit a separate work plan for any proposed laboratory studies to the MDNR. This submittal will be made in the time frame required to maintain steady progress of the overall feasibility study. Additional studies may also be conducted during the design phase if needed, to refine treatability results or develop detailed design criteria. Prepare a report summarizing the testing program and its results, both positive and negative.

TASK 13 - EVALUATION OF THE ALTERNATIVES

A. Evaluation of the Alternatives

Identify and describe action-specific Federal and State ARARs and other criteria, advisories and guidance to be used in the analysis and selection of a remedy. Alternatives should be analyzed in sufficient detail so that the remedies can be selected from a set of defined and discrete hazardous waste management approaches.

Develop and use information necessary to evaluate each alternative. The alternatives will be evaluated against the broad factors of effectiveness, implementability, and cost, using appropriate and more specific component measures such as protectiveness, compliance with applicable or relevant and appropriate requirements (ARARs), reliability, and technical feasibility. The detailed analysis of each alternative shall include both short-term and long-term considerations for effectiveness, implementability and cost.

B. Comparison of Alternatives

Compare the alternatives to each other using the full array of evaluation factors appropriate at the Site.

Component measures of effectiveness include the degree to which the alternative is protective of human health and the environment. Where health-based levels are established in applicable or relevant and appropriate requirements, they can be used to establish the minimum level of protection needed at the Site. Where these levels do not exist, risk assessments can be used to help establish levels appropriate at the Site. The reliability of the remedy, including the potential need for a cost of replacement, is another important element of effectiveness. Specific measures may also include other health risks borne by the affected population, population sensitivities, and the impacts on environmental receptors. For groundwater response actions, the potential for spread of the contaminant plume and the technical limits of aquifer restoration are necessary measures. Another important measure of effectiveness is the degree that the mobility, toxicity, or volume of the hazardous substance, pollutant, or contaminant is reduced.

Component measures of implementability include the technical feasibility of the alternative, the administrative feasibility of implementing the alternative, and the availability of any needed equipment, specialists or off-site capacity. Specific measures for groundwater response actions include the feasibility of providing an alternative water supply to meet current groundwater needs, the potential need for groundwater, and the effectiveness and reliability of institutional controls.

Component measures of cost include short-term capital and operation costs and any long-term operation or maintenance costs. Present worth analysis may be used to compare alternatives.

Component measures should be tailored appropriately to the Site. Where the measures are likely to be important in discriminating among the alternatives, more emphasis and detail may be appropriate to assist in the selection of a remedy.

C. Preferred Remedy

A chapter to the RI/FS shall be prepared which describes the preferred remedy for the Site.

a. The appropriate remedy shall be recommended among those alternatives that meet four findings:

1. The alternative shall be protective of human health and the environment. This means that the remedy meets or exceeds ARARs or health based levels established through a risk assessment when ARARs do not exist or when they are waived.
2. Except under those circumstances listed in the NCP, the alternative shall attain applicable or relevant and appropriate Federal and State public health and environmental requirements that have been identified for a specific site.
3. The alternative shall be cost-effective, accomplishing a level of protection that cannot be achieved by less-costly methods.

4. The alternative will utilize treatment technologies and permanent solutions to the maximum extent practicable as determined by technological feasibility, availability and cost effectiveness.

b. The preferred remedy should reflect two preferences:

1. Remedies involving treatment that significantly reduce the toxicity, mobility, or volume of hazardous constituents as a principal element.
2. Remedies minimizing the requirement for long-term management of residuals.

c. An alternative may be preferred that does not meet applicable or relevant and appropriate Federal and State public health or environmental requirements under the following circumstances:

1. The alternative is an interim remedy and will become part of a more comprehensive final remedy that will meet applicable or relevant and appropriate Federal and State requirements.
2. Compliance with the requirement will result in greater risk to human health and the environment than alternative options.
3. Compliance with the requirements is technically impracticable.
4. The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach.

d. The evaluation of alternatives to select the appropriate remedy should meet the required findings in Section 300.430(e)(9) of the NCP and comply with the Act 307. The selected alternative should represent the best balance across all evaluation criteria.

TASK 14 - DRAFT AND FINAL FEASIBILITY STUDY REPORTS

Prepare a draft and final feasibility study presenting the results of Task 9 through 13. Submit five (5) copies to MDNR.

TASK 15 - ADDITIONAL REQUIREMENTS

Reporting requirements are described in Task 8 of the remedial investigation scope of work.

The State shall reserve for itself the performance of any endangerment/risk assessment associated with this study.

The following are major deliverables (both in draft and final form) and are subject to stipulated penalties as described in the Administrative Order of Consent:

1. Remedial Investigation/Feasibility Study Work Plan
2. Quality Assurance Project Plan
3. Health and Safety Plan
4. Field Sampling Plan
5. QA/QC Review of Historical Studies and Data Plan
6. Data Management Plan
7. Plan for Satisfaction of Permitting Requirements
8. Remedial Investigation (RI) Report
9. Feasibility Study (FS) Report
10. Alternatives Array Document

The submittal of the Draft Description of Current Situation Document will be within 60 days of the effective date of the Administrative Order of Consent (AOC). The submittal of all major deliverables, except the RI Report, the FS Report, and the Alternatives Array Document, will be within 90 days of the effective date of the AOC. The schedule for the submittal of the RI Report, the FS Report, and the Alternatives Array Document, and any other deliverables, will be established in the RI/FS Work Plan.

REMEDIAL INVESTIGATION MODEL WORK PLAN SCHEDULE

TASK NO.	TASK	OUTPUT	TARGET COMPLETION DATE	ACTUAL COMPLETION DATE
1.	Description of Current Situation	Interim Memorandums, Draft, Final Report		
1a.	Site background			
1b.	Nature and Extent of problem			
1c.	History of Response Actions			
1d.	Define boundary conditions			
1e.	Site facilities			
2.	Plans and Management			
2a.	Work Plan	Draft, Final Report		
2b.	Quality Assurance Project Plan	Draft, Final Report		
2c.	QA/QC-Historical Information			
2d.	Data Management Plan			
2e.	Health and Safety Plan	Draft, Final Report		
2f.	Community Relations Plan	Draft, Final Report (prepared by MDMR)		
2g.	Plan for Satisfaction of Permitting	Draft, Final Report		
2h.	ATSDR Health Assessment			
3.	Site Investigations	Technical Memorandums, Drafts, Final Reports		
3a.	Waste Characterization			
3b.	Hydrogeological Investigation	Note: Monthly progress reports shall be given on the hydrogeologic investigation.		
3c.	Soils and Sediments Investigation			
3d.	Air Investigation			
3e.	Surface Water			
3f.	Biota Contamination			
3g.	Technical Memorandum			

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TASK NO.	TASK	OUTPUT	TARGET COMPLETION DATE	ACTUAL COMPLETION DATE
4.	Preliminary Remedial Technologies	Interim Memorandums, Drafts, Final Reports		
4a.	Pre-Investigation Action			
4b.	Post Investigation Evaluation			
5.	Site Investigations Analysis	Interim Memorandums, Draft, Final Report		
5a.	Data Analysis			
5b.	Application to Preliminary Technologies			
6.	Remedial Investigations Report	Draft, Final Report		
7.	Community Relations Support			
8.	Additional Requirements Reporting Requirements	Monthly Progress Reports		

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KZ00150563

IT IS SO AGREED AND ORDERED BY:

David F. Hales
David F. Hales, Director
Michigan Department of Natural
Resources

Date: 12/29/90

IT IS SO AGREED:

HM HOLDINGS, INC.

By: Stuart G. Braslow
Stuart G. Braslow
Assistant Secretary

Date: 10/20/90

GEORGIA-PACIFIC CORPORATION

By: Andrew F. Hodges
Andrew F. Hodges
Senior Counsel

Date: 9/26/90

PLATINWELL
SIMPSON PAPER COMPANY

By: A. T. Raul
Vice President and
Chief Financial Officer

Date: October 15, 1990

KB10003110-01

KZ00150565



Executive Summary

Remedial Investigation / Feasibility Study and Supplement Reports

Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site

Kalamazoo and Allegan Counties, Michigan
October 1999

This Executive Summary presents an overview of the data, analyses, and other information compiled within the remedial investigation and feasibility study (RI/FS) reports for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site located in Kalamazoo and Allegan counties, Michigan. Also presented are findings from extensive additional analyses of the most up-to-date data available from the Kalamazoo River (collected in 1999 and 2000), which, at the request of the Michigan Department of Environmental Quality (MDEQ), are presented separately in the report titled Supplement to the Kalamazoo River RI/FS.

With oversight by the MDEQ, the Kalamazoo River Study Group (KRSRG) has conducted the RI/FS to accomplish several objectives as directed by the 1991 Administrative Order by Consent (AOC), including:

- Identify sources of PCBs to the site (polychlorinated biphenyls • the chemicals of concern at this site).
- Characterize the nature and extent of PCBs and other chemicals at the site.
- Identify PCB transport and exposure pathways to enable quantification of PCB fate and potential risks.
- Collect data sufficient to complete risk assessments and develop remedial alternatives to be evaluated in a feasibility study.
- Provide opportunities for local residents and other stakeholders to review site information.

Background and Scope...

See Page 2 and RI Sections 1 and 2
See Supplement Sections 1 and 2

Data and Analyses...

See Page 2 and RI Sections 3 to 5
See Supplement Section 3

Risk Evaluation...

See Page 2 and RI Section 6
See Supplement Section 3

Remedial Objectives...

See Page 2 and RI Sections 7 and 8
See Supplement Sections 4 and 5

Remedial Alternatives...

See Page 2 and RI Sections 9 to 11
See Supplement Sections 6 and 7

Additional Analyses and

Updates to the RI/FS
See Supplement Sections 8 and 9

Site Background

For more than half of the 20th century, PCBs were legally used by many industries for manufacture of electrical components and other products that benefited from their fire retardant and other chemical properties. Between the late 1950s and early 1970s, used office paper sold for recycling often contained carbonless copy paper (also referred to as NCR paper). This carbonless copy paper incorporated an ink and PCB mixture. Through the process of recycling used office paper into new paper products, PCBs were released to the site through the mills' waste streams. After 1971, PCBs were removed from the manufacture of carbonless copy paper. By 1977, the potential adverse environmental and health effects of PCBs were better understood and the government banned most uses of PCBs.

The same chemical properties that made PCBs useful to industry are now responsible for persistent levels of PCBs remaining in the environment, including the Kalamazoo River. PCBs persist in the environment because they adhere readily to organic material in sediments and soils, and tend to bioaccumulate in the fatty tissue of fish and other animals.

Due to PCBs in the Kalamazoo River, extensive environmental studies of surface water, sediment, floodplain soils, groundwater, air, biota, and several active and inactive industrial facilities have been underway since the Allied Paper, Inc./Portage

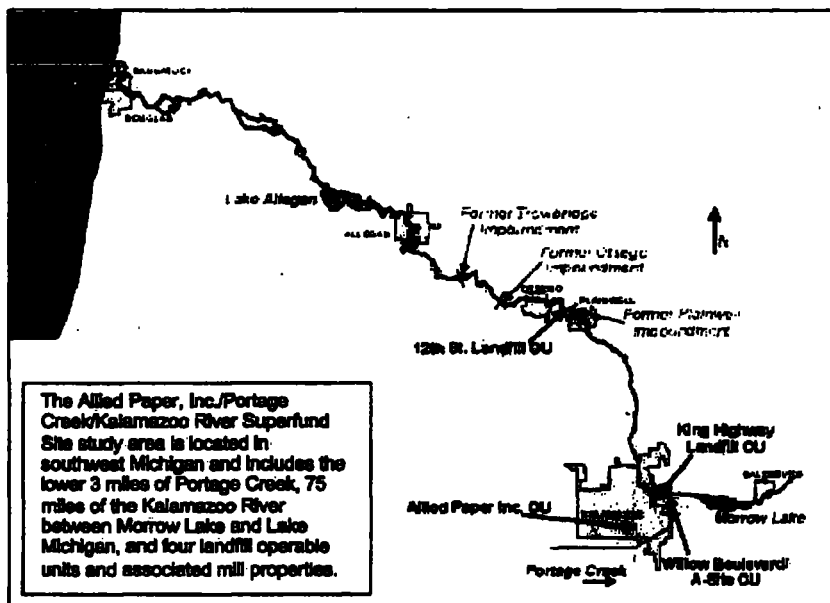
Creek/Kalamazoo River Superfund Site was added to the National Priorities List (NPL) in 1990.

Under the 1991 AOC, the companies that make up the KRSR agreed to conduct the RI/FS for the Kalamazoo River, which began in 1993 after the Michigan Department of Natural Resources (MDNR) approved comprehensive work plans for the studies. Today, the KRSR includes Millennium Holdings, Inc., Georgia-Pacific Corporation, Fort James Corporation, and Plainwell, Inc., all of which own or once owned paper recycling mills along the Kalamazoo River or Portage Creek.

The total geographic scope of the RI/FS stretches across 90 miles of river from Battle Creek to Saugatuck, and includes several investigations conducted between 1993 and 2000. These Phase I

RI/FS reports focus on the river upstream of Lake Allegan Dam; separate Phase II RI/FS reports will be issued for the lower river between Lake Allegan and Lake Michigan.

RI/FS activities are being managed by MDEQ under the federal Superfund program of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). As the lead agency on this site, the MDEQ is working cooperatively with the U.S. Environmental Protection Agency (USEPA) and other government agencies, as needed.



Remedial Investigation Summary

Extensive investigations of Kalamazoo River and Portage Creek sediments, surface water, floodplain soils, fish, and other biota are now complete or nearing completion. Starting in 1993, several distinct but related investigations began, including:

- Source Investigation
- Mills Investigation
- Floodplain Soil Investigation
- Sediment Investigation
- Surface Water Investigation
- Biota Investigation

These studies have yielded over 1 million data points, measurements, and observations that are now available for scientific and engineering evaluation, risk assessment, and risk management decision making.

DRAFT FOR STATE AND FEDERAL REVIEW

OU or Mill Property	Remedial Action	Status of RI/FS Activities
Allied OU/Bryant Mill Pond	Capped 18-acre landfill and stabilized berms Excavated 150,000 cy from Bryant Mill Pond RI/FS and OU closure	Complete Complete Ongoing
King Highway Landfill OU	Capped 23-acre site and stabilized berms	Complete
Willow Boulevard/A-Site OU	Excavated 7,000 cy and stabilized A-Site berms RI/FS and OU closure	Complete Ongoing
12th Street Landfill OU	RI/FS and OU closure	Ongoing
Former Allied Paper Bryant Mill	Sampling indicated no action necessary	Complete
Former Allied Paper King Mill	Excavated 11,000 cy to date; further work needed	Ongoing
Former Allied Paper Monarch Mill	Sampling indicated no action necessary	Complete
Georgia-Pacific Kalamazoo Mill	Excavated 33,000 cy and restored area	Complete
(Simpson) Plainwell Mill	Cleaned storm sewers	Complete
King Street Storm Sewer Area	Excavated 5,000 cy and restored area	Complete

While the Kalamazoo River RI/FS has been underway, significant voluntary remedial actions and additional RI/FS efforts have been moving forward at the four landfill operable units (OUs) and other locations of the site, as summarized in the table above. The OUs are being managed separately to allow work to progress concurrently with the much larger river investigations. The four OUs are the Allied Paper, Inc. OU on Portage Creek, King Highway Landfill OU and Willow Boulevard/A-Site OU both in Kalamazoo, and the 12th Street Landfill OU in Plainwell.

To date, over 5,000 samples of sediment, soil, water, and biota have been collected from the Kalamazoo River and analyzed for PCBs and other chemicals. The bulk of the data presented in the RI/FS reports are from 1993 and 1994, when the first large-scale sampling occurred on the river. However, investigations continue today with additional data being collected throughout the river to further refine evaluations of PCB sources, distribution, potential transport (movement), and risks.

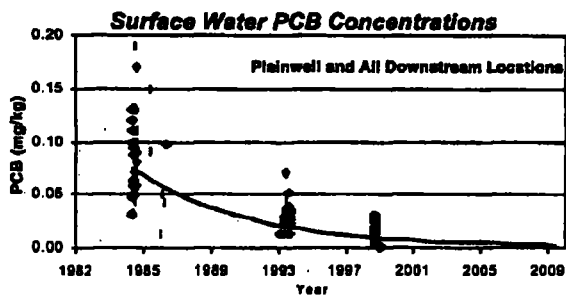
The Supplement to the Kalamazoo River RI/FS presents the most up-to-date findings of these additional studies, focusing particularly on how conditions have continued to improve during the 1990s. The Supplement also describes how new tools are under development to help MDEQ and others determine the best course of action for improving the Kalamazoo and further reducing risks. For example, scientists are developing a sophisticated computer-based mathematical model of the Kalamazoo River to better understand the movements and fate of sediment and PCBs in the river. This new tool, and the new data used to develop it, is fully discussed in the Supplement report, including how it has been used to evaluate current conditions in the river and how potential future remedial actions would improve those conditions.

The three primary conclusions that can be drawn from the remedial investigation are:

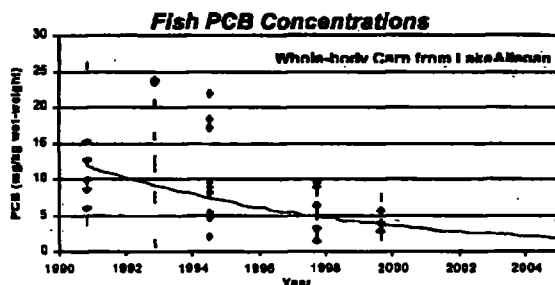
- *PCB concentrations in fish, surface water, and surface sediment have decreased significantly over the past 20 years as a result of natural recovery processes in the Kalamazoo River.*
- *Continuing uncontrolled sources of PCBs are depressing the rate of natural recovery and playing an increasing role in potential risks.*
- *PCB concentrations in submerged sediment are low and relatively evenly distributed throughout the site. There are no apparent "hot spots" where a large mass of PCBs is concentrated within a small volume of sediment.*

As shown in the figure on the next page, multiple lines of evidence support the conclusion that PCB concentrations have decreased markedly over the past two decades due to natural recovery processes. Natural recovery (technically called "natural attenuation") occurs when the physical, chemical, or biological processes in nature degrade or isolate contaminants over time. Because the Kalamazoo River is dominated by several dams and impoundments, the physical process of PCB and sediment burial removes PCBs from the uppermost surface layer of the sediment bed (in impounded areas) where they would otherwise be available for uptake by fish and other organisms.

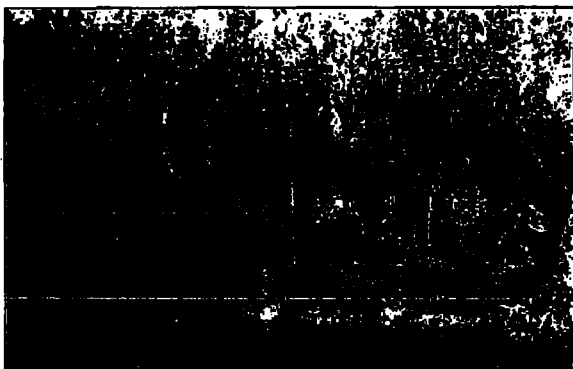
RI and the latest supplemental data confirm that natural recovery is active in the Kalamazoo River and is responsible for the observed decrease of PCB levels in fish and surface water. The figure below shows these declines, which have already decreased exposure and potential risks, and are expected to continue into the future.



Natural recovery of the Kalamazoo River is evident in how dramatically PCB levels in surface water and fish have fallen during the 1980s and 1990s. The above graph shows decreases in water, and the graph below shows how PCB levels in Lake Allegan fish (carp in this example) have declined over time. Additional sampling is continuing this year to confirm these trends and similar decreases observed in other fish species and in surface sediments.



In contrast to the positive gains from natural recovery, the RI identified several uncontrolled sources of PCBs that continue to impact the system today. The most significant of these is the erosion of PCB-containing material from what used to be submerged sediments in the three MDNR-owned former Plainwell, Otsego, and Trowbridge impoundments (see photo below).



Former sediments like these had been submerged in MDNR's three impoundments until the 1970s when the MDNR drew down its impoundments to present levels. Today these former sediments are exposed above the water line and have become a major source of PCBs as they slowly erode into the river.

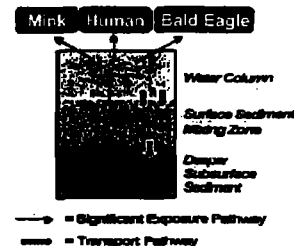
When MDNR drained the impoundments in the 1970s, these former sediments were left above today's water line and now contribute up to 100 kg of PCBs to the river each year. If this source of PCBs were controlled, the rate and effectiveness of natural recovery would increase and risks would further decrease.

The thousands of sediment data points collected from the river show that PCB concentrations in channel sediments are low. In fact, 76% of surface sediment samples had PCB concentrations below 1.0 mg/kg, and 97% were less than 10 mg/kg. Further, there are no PCB "hot spots" in these sediments that would need to be remediated to reduce localized exposure.

Evaluation of Potential Risks

The Michigan Department of Community Health (MDCH) and the Agency for Toxic Substances and Disease Registry (part of the U.S. Department of Health and Human Services) agree that recreational activities such as boating, swimming, and wading in the Kalamazoo River are safe. This is because water and sediment PCB concentrations are low and the potential amount of PCB that could be absorbed through the skin is small. Based on risk assessments conducted for the river, consumption of fish is the only significant PCB exposure pathway for both humans and ecological receptors like bald eagles and mink.

"Bioavailable" PCBs are those located in the water column or surface sediment. From there, PCBs can accumulate in fish and be passed to people or wildlife if those fish are eaten. Or, natural attenuation processes ongoing in places like Lake Allegan (right) can bury PCBs in the sediment bed where they become unavailable for exposure or transport.



While MDEQ's initial screening-level ecological risk assessment found that certain song birds and small mammals might have been at risk from exposure through the terrestrial (land-based) food web, more in-depth studies by Michigan State University scientists using up-to-date plant data from the site show that these animals are not at risk from PCBs. This is further explained in the Supplement to the RI/FS.

As shown in the figure above, fish play a central role at this site because they concentrate PCBs. These PCBs are then passed up the aquatic (water-based) food chain and may pose risks if receptors such as people, mink, or bald eagles eat too many fish or eat them too often.

PCBs in surface sediments or the water column will wind up either buried in deep sediment where they are not available for exposure, or will find their way into fish and eventually into the people and animals who eat those fish.

Overall, the risk evaluations conducted thus far on the Kalamazoo River show that reducing PCB levels in fish is the key to reducing potential risks to anglers and fish-eating wildlife. Thus, the goal of any additional remedial action at the site must be to reduce PCB levels in fish in a way that does not increase risks or reverse the significant benefits already gained through more than 20 years of natural recovery.

Remedial Response Objectives

Remedial response objectives (RROs) are the specific goals that a remedial plan must meet to be considered successful in reducing risks. RROs are the starting point for developing and evaluating remedial options in the feasibility study, leading eventually to selection and implementation of a remedial plan for the site.

Both the RI report and Supplement to the RI/FS show conclusively that the natural processes at work in the river are responsible for the observed decreases of PCB concentrations in fish, the water column, and surface sediments. However, the RI identified sources that continue to put PCBs into the river today. The predominant source is erosion of the riverbanks within MDNR's three former impoundments. Controlling these sources would have the double benefit of reducing the amount of PCBs in river water carried downstream to be deposited in Lake Allegan or Lake Michigan, and speeding up the rate of natural recovery. Both improvements would further reduce PCB levels in fish.

Given these considerations, the primary goal (or RRO) for any remedial plan for the Kalamazoo River is to:

- ***Reduce PCB concentrations in Kalamazoo River fish tissue to acceptable levels in terms of human health and ecological risk.***

Related goals that would improve the overall quality of the river and continue to help reduce potential risks associated with eating Kalamazoo River fish are:

- ***Reduce water-column transport of dissolved or particle-bound PCB to Lake Michigan.***
- ***Reduce PCB loading to the Kalamazoo River.***

Feasibility Study Summary

To accomplish the remedial objectives and protect human health and the environment, specific remedial technologies and strategies have been developed and evaluated in the site's feasibility study. This detailed engineering study describes several remedial options and evaluates them against key decision making criteria required by CERCLA and NCP regulations.

For the Kalamazoo River, the potential remedial approaches available fall into 12 categories (called general response actions, see box below) for managing site risks, ranging from no further action to technologies such as sediment capping or removal. Within these categories, a total of 66 specific options were evaluated in the feasibility study in terms of their effectiveness, implementability, and relative cost.

General Response Actions Considered in the Kalamazoo River Feasibility Study

No Further Action - No additional action would be taken.

Source Control - Continuing sources of PCBs would be identified and eliminated or reduced.

Institutional Controls and Monitoring - Fish consumption advisories, dam maintenance, and other administrative measures would be used to reduce PCB exposure. Long-term monitoring tracks changes in site conditions over time.

Monitored Natural Attenuation - Natural processes reduce PCB exposure over time, which would be verified periodically through an extensive long-term monitoring program.

In-place Containment - Natural or engineered barriers stabilize and isolate PCBs in place. Sediment capping and stabilization of eroding riverbanks are two examples.

Hydraulic Modification - The river channel itself would be modified or moved to reduce PCB exposure and transport.

Sediment Treatment - Sediments would be treated in place or after removal to reduce toxicity and volume.

Sediment Removal - Sediments would be removed via hydraulic dredges or mechanical excavation.

Sediment Dewatering - Sediments removed from the river would contain large amounts of water that would need to be removed prior to sediment disposal.

Sediment Disposal - Once removed, sediments would be transported off-site to existing landfills or put into on-site confined disposal facilities (CDFs) built near the river.

Residuals Management - Treatment or other wastes would have to be properly managed to prevent exposure.

Fisheries Management - Includes measures to remove PCB-containing fish or modify their habitat.

Kalamazoo River Remedial Alternative Evaluation Matrix

NCP CRITERIA	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Overall Protection of Human Health and the Environment	<ul style="list-style-type: none"> Reduces risk through natural attenuation. Limited achievement of RROs. Overall protection limited by continuing PCB inputs that will slow rate and effectiveness of natural recovery. 	<ul style="list-style-type: none"> Reduces risk through natural attenuation. Limited achievement of RROs. Protection enhanced by fish consumption advisories and monitoring natural recovery. 	<ul style="list-style-type: none"> Reduces risk through source control by stopping erosion of former sediments from riverbanks of MDNR's three former impoundments. All RROs achieved. 	<ul style="list-style-type: none"> Reduces risk by minimizing PCB loads from eroding bank sediments and isolating/capping PCB in place. Natural recovery disrupted during the 40-year project. No additional risk reduction over Alternative 3. All RROs achieved, but on a protracted time frame. 	<ul style="list-style-type: none"> Dredging targets removal of PCB mass but cleanup goals are unlikely to be obtained. Natural recovery disrupted during the 25-year project. No additional risk reduction over Alternative 3. All RROs achieved, but on a protracted time frame.
Compliance With ARARs	<ul style="list-style-type: none"> PCB water quality standards would need to be waived. 	<ul style="list-style-type: none"> PCB water quality standards would need to be waived. 	<ul style="list-style-type: none"> PCB water quality standards would need to be waived. 	<ul style="list-style-type: none"> PCB water quality standards would need to be waived. 	<ul style="list-style-type: none"> PCB water quality standards would need to be waived.
Long-term Effectiveness	<ul style="list-style-type: none"> Natural recovery would continue to reduce risks to both humans and wildlife. Effectiveness not monitored. 	<ul style="list-style-type: none"> Natural recovery would continue to reduce risks to both humans and wildlife. Effectiveness ensured through maintenance of impoundments and dams. Long-term monitoring will track effectiveness. 	<ul style="list-style-type: none"> Would decrease PCB in fish, water, and surface sediments over long-term. Proper design, maintenance, and enhanced monitoring program would assure long-term reliability. 	<ul style="list-style-type: none"> Potentially reliable & effective. Construction would take 40 years, delaying benefits. Impact to benthic community may be irreversible. Flood flows could be altered and flood capacity decreased, thus increasing erosion. 	<ul style="list-style-type: none"> Potentially reliable & effective. Assumption that PCB cleanup goals would be met is likely optimistic. Benthic community and habitat completely destroyed. Fishery impacts uncertain and recovery potential unknown.
Reduction of Toxicity, Mobility, or Volume through Treatment	<ul style="list-style-type: none"> No reductions through treatment. 	<ul style="list-style-type: none"> No reductions through treatment. 	<ul style="list-style-type: none"> No reductions through treatment. 	<ul style="list-style-type: none"> No reductions through treatment. 	<ul style="list-style-type: none"> Treatment is not significant. Low PCB concentrations, high material volumes, and technology limitations make treatment impractical.
Short-term Effectiveness	<ul style="list-style-type: none"> No short-term adverse impacts. Removal of fish consumption advisories could increase short-term risk. 	<ul style="list-style-type: none"> Short-term effectiveness high since natural recovery is not disrupted and monitoring and institutional controls are implemented quickly. 	<ul style="list-style-type: none"> Short-term impacts include localized disruption of habitats in former impoundments, localized disruption of recreational activities, moderate increase in local truck traffic. 	<ul style="list-style-type: none"> All potential impacts for Alternative 3 apply. River-wide disruption or destruction of wildlife habitat. Significant increase in site-wide truck traffic. Worker safety risks created due to 40-year time frame and construction complexity. 	<ul style="list-style-type: none"> All potential impacts for Alternative 3 apply. River-wide destruction of benthos and wildlife habitat. Significant increase in site-wide truck traffic. Worker safety risks created due to 25-year time frame and construction complexity.
Implementability	<ul style="list-style-type: none"> Technically and administratively feasible. 	<ul style="list-style-type: none"> Technically and administratively feasible. 	<ul style="list-style-type: none"> Technically and administratively feasible. Bank stabilization uses reliable and conventional methods and materials. 	<ul style="list-style-type: none"> Administratively feasible. 40-year time frame. 14,500,000 cubic yards of materials necessary. 2,500,000 truck trips to move materials on and off site. 	<ul style="list-style-type: none"> Achieving cleanup goals may be technically infeasible. Siting on-site disposal CDFs administratively difficult. 25-year time frame. 29,000,000 cubic yards of materials necessary, and 4,800,000 truck trips.
Cost (NPV = Net Present Value)	No capital or O&M costs.	Capital = \$0 O&M = \$1,186,000 Total = \$1,186,000 (\$853,000 NPV)	Capital = \$43,340,000 O&M = \$29,846,000 Total = \$73,186,000 (\$40,679,000 NPV)	Capital = \$961,980,000 O&M = \$772,402,000 Total = \$1,734,382,000 (\$300,494,000 NPV)	Capital = \$2,652,230,000 O&M = \$68,225,000 Total = \$2,618,445,000 (\$839,747,000 NPV)

Proposed Remedial Plan

After a thorough assessment, which included consideration of the findings of the RI and risk evaluations as well as a comparative evaluation against NCP criteria, the most timely, reliable, cost-effective, and protective remedial alternative was determined to be Alternative 3 (stabilization of eroding banks in the former impoundments, monitored natural attenuation, and institutional controls). On balance, Alternative 3 is expected to deliver the greatest overall level of risk reduction in fish, surface water, and surface sediment while minimizing habitat impacts and construction-related risks during implementation.

Alternative 3 is expected to reduce risks primarily through source control and natural recovery, a viable approach recognized by the USEPA in its national Contaminated Sediment Management Strategy. Specifically, the eroding riverbanks in the former impoundments would be stabilized to control that source of PCBs, an extensive monitoring program would track the continued effectiveness of natural attenuation, maintenance of institutional controls such as fish consumption advisories would continue, and other uncontrolled PCB sources would be investigated for possible further response action by MDEQ.

This plan will be effective not only because of its ability to reduce risks. It also avoids most of the negative impacts inherent in the more intrusive alternatives (Alternatives 4 and 5), such as protracted time frames, highly complex construction projects, potentially serious worker safety risks, and widespread destruction of habitats both in the river and along its banks.

Further, the proposed remedial plan is designed to complement the benefits already achieved through remediation of the KRSR mill properties and OUs and work in conjunction with the ongoing natural recovery processes already responsible for significant improvements in river conditions over the past two decades. In fact, based on modeling and analyses

presented in the RI/FS reports and the Supplement report, Alternative 3 is expected to speed up decreases in PCB levels in fish, water, and surface sediment. The comprehensive maintenance and monitoring program, and regulatory review required every 5 years at all Superfund sites, will include measurement of the remedy's actual performance against predicted performance to ensure the remedy is protective over the long term.

During implementation of the remedy, institutional controls would be maintained to continue to protect human health and reduce risks from PCB exposure. For example, fish consumption advisories (the best interim protection from the only PCB-exposure pathway for humans) would continue to be issued by MDCH, and all dams and impoundment pool elevations would be maintained by their owners to ensure that existing PCB-containing sediment deposits remain stable and immobilized behind the dams.

Extensive new data have been collected in recent years and applied to the "KALSIM" fate and transport model being developed for the Kalamazoo River. These up-to-date data and the new modeling tool have helped increase the level of confidence in the evaluation of remedial alternatives. As explained in detail in the Supplement to the RI/FS, the model has been developed using data collected from the

Kalamazoo River and its watershed, and is a good tool for evaluating the expected outcomes of remedial alternatives.

When the model was set to closely mimic actual conditions and how PCBs, sediments, and water move through the system, all five remedial alternatives were programmed into the model and resulting conditions were forecast up to 40 years into the future. As shown in the figure on the next page, the results confirmed what simpler calculations had concluded in the RI and FS reports: the eroding riverbanks of the three former impoundments are the highest priority for remediation, and large-scale remediation of river (submerged)

Primary Benefits of Alternative 3

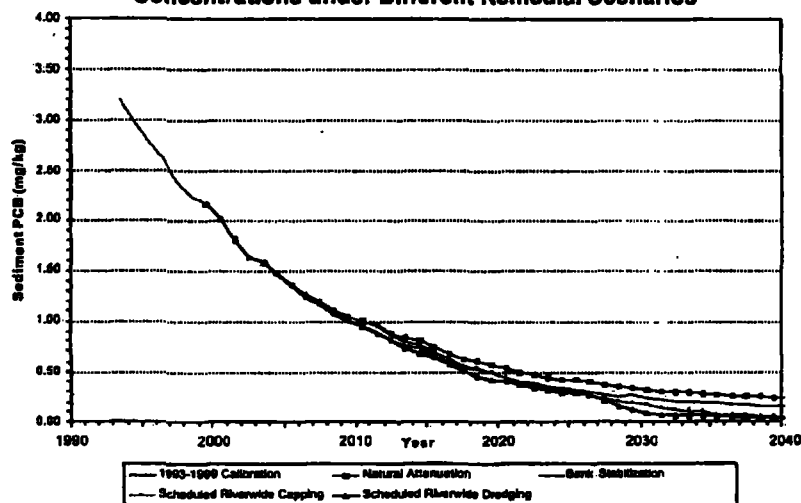
- Remedy will reduce risks and achieve all three remedial objectives:
 - reduce PCB levels in fish
 - reduce PCB transport
 - reduce PCB loading
- Source control (bank stabilization) will increase rate and effectiveness of natural recovery.
- Comprehensive long-term monitoring program will track effectiveness of remedy.
- Short-term risks due to construction and habitat destruction are minimized.
- Design and construction will take just 6 years and use proven, reliable methods.
- Over \$73 million in capital and O&M costs would be invested in risk reduction efforts and long-term monitoring of remedy performance.
- Remedy performance would be monitored and carefully reevaluated by MDEQ and USEPA every five years, as required by CERCLA.
- Alternative 3 delivers the greatest overall net environmental benefits to the community and Kalamazoo River watershed.

sediments would do little to improve upon the gains already achieved through more than two decades of natural recovery.

Coupled with work already accomplished and the assurances through long-term monitoring that natural recovery and the additional source controls proposed

will perform as expected, the proposed remedy will significantly speed up recovery of the river and reduce potential risks posed by PCBs to anglers and local wildlife.

KALSIM Model Forecast of Lake Allegan Surface Sediment PCB Concentrations under Different Remedial Scenarios



Compared to more intrusive and complex capping or dredging remedies, Alternative 3 (bank stabilization and natural recovery) reduces PCB concentrations (and risks) over similar time frames, but with far fewer adverse impacts and for less cost. Using the KALSIM model, the above graph shows forecasted trends for Lake Allegan surface sediment PCB concentrations.

The Future...What's Next?

Once the RI/FS reports are reviewed and approved by the MDEQ, a formal "Proposed Plan" document will be prepared to summarize the preferred remedy and formally present it to the public for review and comment. A public comment period (typically 30 days) then follows to gather input on the plan from local residents and numerous other stakeholders. During the comment period, MDEQ will hold one or more public meetings to present the Proposed Plan and gather public comments first-hand.

After all comments are received, the MDEQ will prepare the Record of Decision (ROD) to explain in detail what the final remedial plan will be and

In summary, Alternative 3 is expected to deliver the greatest overall net benefits to local communities and the Kalamazoo River watershed through timely implementation of a project that will invest over \$73 million in effective risk reduction measures and long-term monitoring of remedy performance. Moreover, this proposed work is in addition to the significant remedial actions already accomplished in recent years at the four landfill operable units and other KRSR properties on the Kalamazoo River and Portage Creek.

what legal and technical requirements it must meet to be successful. When the ROD is finished and signed, engineers will begin to design and construct the remedy. Following construction, the long-term monitoring and maintenance program would ensure that the remedy performs as designed. Every 3 to 5 years, samples are collected to track the effectiveness of the remedy. In addition, MDEQ and USEPA would conduct regulatory reviews every 5 years to assess remedy performance.

For More Information...

Additional information and reports are available at these local libraries or by contacting the MDEQ project manager listed below:

Allegan Public Library
331 Hubbard St.
Allegan, Michigan
(616) 673-4625

Waldo Library
Western Michigan University
Kalamazoo, Michigan
(616) 387-5156

Kalamazoo Public Library
315 South Rose
Kalamazoo, Michigan
(616) 342-9837

Otsego District Library
219 South Farmer St.
Otsego, Michigan
(616) 694-9690

Saugatuck-Douglas District Library
10 Mixer St.
Douglas, Michigan
(616) 857-8241

Charles Ransom District Library
180 South Sherwood Ave.
Plainwell, Michigan
(616) 685-8024

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Michigan Department of Environmental Quality

Comments to
Draft Remedial Investigation / Feasibility Study Documents
Submitted by Kalamazoo River Study Group

July, 2002

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FOIA
EXEMPT

May 11, 2001

Brian von Gunten
MDEQ, Environmental Response Div.
Knapps Centre
P.O. Box 30426
Lansing, MI 48909-7926

DRAFT

Dear Brian:

U.S. EPA has completed its review of the draft RI/FS for Phase I of the Kalamazoo River and the Supplement to the Kalamazoo River RI/FS - Phase I, all dated October, 2000. Our comments are provided below.

REMEDIAL INVESTIGATION REPORT***General Comments******1. Potential Owner/Operator Liability of Michigan Department of Natural Resources***

The essential purposes of an RI/FS are (1) to characterize the nature and extent of hazardous contamination at a Site; and (2) to develop and evaluate effective remedial alternatives. The document should not be used to support or defend against a liability lawsuit. Nevertheless, a significant portion of the RI and, to a lesser extent, the FS, appears to be devoted to targeting the Michigan Department of Natural Resources as a potentially responsible party for the PCB contamination in the Kalamazoo River. In many cases, the RI reads like a legal brief supporting the PRPs' argument that the MDNR exacerbated the harm in the Kalamazoo River by opening up the gates and lowering the sills on three dams. Page 3-14 of the RI is only one of many instances where the PRPs explain their argument concerning MDNR liability, and states:

The release of impounded water resulting from the drawdown increased flow velocities near the dams by factors ranging from 5 to 15 (GZA-Donohue, 1990). The high velocities increased erosion of the channel bed and side slopes, resulting in downstream transport and dispersal/redistribution of PCB-containing sediments . . . A total of

approximately 1.1 million cubic yards (cy) of PCB-containing sediment were displaced from the three impoundments as a direct result of MDNR permanently opening the dams. These sediments, transported downstream and redeposited, contained approximately 14,800 kilograms (kg) of PCB, a significant portion of the PCB mass currently residing in the sediments of Allegan City Impoundment and Lake Allegan . . . These actions interrupted and, in fact, reversed several years of natural burial of PCB by progressively cleaner sediment. By exposing hundreds of acres of former sediments, drawdown of the impoundments caused an increased potential in PCB bioavailability and created new exposure pathways for terrestrial biota receptors that were able to colonize drained areas, thereby potentially impacting related ecological food chains. . . .

Appendix F of the RI, entitled "Impacts of the MDNR Dam Removal," is devoted entirely to the PRPs' argument regarding the effect of MDNR's activities at the Site.

These lengthy arguments and analyses of the effect of MDNR's actions with regard to the three dams are simply inappropriate to an RI/FS. Although some history of the sources and means of contamination have a rightful place in a complete RI, the protracted and self-serving references to MDNR's activities at the site should be deleted from this document.

2. Disclaimer and subsequent references to the fate and transport model:

The very first page of text in the RI is a disclaimer, which immediately sets up a second conflict between MDEQ and the PRPs who have performed the RI. The disclaimer reads, in relevant part:

Th[e] expressed opinions, findings, and conclusions regarding the transport, fate, and effects of PCBs in the Kalamazoo River presented in this document have been significantly limited by the Michigan Department of Environmental Quality's prohibition on the use of the results of certain studies and data, and the application of computer models to assess the transport and fate of PCB in the Kalamazoo River.

Because MDEQ prohibited the PRPs from using the fate and transport model they developed, the PRPs created an unauthorized Supplement to the RI/FS, which is referenced throughout the original document.

The language of the disclaimer and the repeated references to the Supplement create the impression that MDEQ is trying to hide important information from the affected community. MDEQ has hired a consultant to review the findings and conclusions of the fate and transport model (and hopefully, all other conclusions contained in the Supplement). The reliability of all of the material within the PRPs' Supplement should be resolved among MDEQ, U.S. EPA and the PRPs prior to a second draft of the RI/FS, and then all antagonistic comments deleted.

3. There is inadequate evaluation of the utility of regressions beyond whether they meet statistical significance, in particular, inconsistent consideration of the coefficient of determination (r^2). The coefficient of determination shows the proportion of the total variation of the dependent variable that is explained by the linear regression model. A significant statistical correlation is meaningless if the regression only accounts for a trivial portion of the variation in the character being investigated. For example, it is not helpful to know that dissolved and particulate phase PCB concentrations in water are "significantly negatively correlated with flow" when the r^2 are only 0.17 and 0.16, respectively (Section 4.5.2.1). This means that the statistically significant correlation with flow accounts for only one-sixth of the variation in PCB concentrations in surface water, and that five-sixth of the variation is not linearly correlated with flow.

The RI treats coefficient of determination values inconsistently. The conclusion that sediment contamination is relatively homogenous is supported by the geostatistical study that showed over relatively small distances "approximately half of the variability on PCB concentration was independent of spatial relationships" (p. 4-13). This infers that approximately one-half of the variability of PCB concentration is spatially correlated. The RI's conclusion in this regard is inconsistent with the conclusion that the multivariate regression model for PCB distribution in the Kalamazoo River shows "strong predictive capabilities" (p. 4-22) when the r^2 for the multivariate model for all reaches are 0.55 and 0.36 for surficial and all samples, respectively (p. 4-21) (i.e., the multivariate model does not explain approximately one-half to two-thirds of the variability of sediment PCB concentrations).

The trend analyses of PCB concentrations in sediment, surface water, and fish are mainly influenced by the large decreases that occurred between the 1980s and early 1990s. However, the data indicate that the declines have significantly slowed or stopped between the early and late 1990s (the timing varies depending on the media—earlier asymptote for sediment and later for surface water and fish, but all show evidence of attaining relative stasis). Use of 1980s-to-early-1990s-dominated trends to project future conditions therefore appears to be unjustified.

The trend analysis for PCBs in fish is flawed because it focuses on wet-weight concentrations, which are confounded by changes in fish lipid content between sampling events. Lipid-normalized fish concentrations show no declines since the early 1990s (with the notable exception of Lake Morrow fish).

Specific Comments:

1. Page 1-4, box entitled "Why More Data?" The box states that fish were collected and analyzed using the same methods as those of the RI/FS Workplan. EPA hasn't seen any documentation to this effect, please provide it.

2. Page 1-4, second para. Explain why MDEQ has directed KRSR to exclude this info from the RI/FS (i.e., the data was collected without an approved work plan or QAPP with no oversight).
3. Page 1-7, The RI challenges the conclusion that PCB contamination in fish poses a threat to human health. The RI cites a recent survey of Kalamazoo River anglers that purportedly "found no elevation of PCB blood levels in those who ate Kalamazoo River fish other than that attributable to age." Does MDEQ agree with this?
4. Page 1-8, The description of PCB as "sequestered in the sediment bed of the former impoundments" should be changed to "deposited in ...". No demonstration was made to show that the bioavailability (through aquatic exposure routes) of the impoundment sediment PCB was negligible prior to the impoundment drawdown, as implied by the phrase "sequestered".
5. Page 1-11, top of page. Explain the significance of the stages discussed above mean sea level (MSL).
6. Page 1-13, general comment. It appears we need to evaluate cleanup alternatives that assume the dams are left in place *and* alternatives that assume the dams are removed to have a full array of alternatives.
7. Page 2-1, last para. Please explain why the additional studies were not done in accordance with the AOC? Why was no work plan submitted for review, and why was no state oversight allowed by the PRPs during sample collection?
8. Page 2-2, top of page. Again, as on page 1-4 the report states that additional sampling was performed using the same protocols and QA/QC used in the 1993/1994 investigations, however there is no documentation that this is the case. Please provide specifics as to how samples were collected, preparation of samples, chain of custody, lab used, lab method used, etc. Again, why wasn't the state invited to conduct oversight?
9. Page 2-7, third bullet. What was the focus of the "focused sampling?"
10. Page 2-8, Sediment Characterization. In brief, conclusions based on the sediment sampling are generated by a total of 1,076 unique locations (RI page 2-6). The surface area of the river is 2,800 acres, plus 1,000 acres of exposed sediments in former impoundments (RI page 1-9 to 1-12), totaling 3,800 acres with an average of 1 core/grab per 3.5 acres of potentially contaminated material. Additionally, the sample design is composed of transects, resulting in groups of highly correlated samples with large areas of no data between points. Any statistics (average, standard deviation, median, etc) and inferences should account for the spatial dependence. No secondary sampling has been done to examine the extent of the contamination where PCBs have been previously

detected. As a result, the conclusion that the sediment has been adequately characterized may lead to some erroneous conclusions.

11. Page 2-16, third para. Why is there no mention of the eco risk assessment prepared by MDEQ? Jim Chapman - is there some comment we could make like: their "comprehensive baseline eco risk assessment" won't be any better than DEQ's? Is theirs superior because they will have actual site-specific data? I don't think the NCP requires site-specific data. What could we say?

12. Page 3-15, "These actions [impoundment drawdown] interrupted and, in fact, reversed several years of natural burial of PCB by progressively cleaner sediment."

The claim that there were "several years of natural burial of PCB by progressively cleaner sediment" prior to the impoundment drawdown is unsupported, and is contradicted by the close overlap in the timing of the impoundment drawdown and the cessation of paper recycling (both in the early 1970s according to Sections 1.3 and 3.7), and the former impoundment sediment profiles in which "PCB concentrations tended to be highest in the uppermost layer" (Section 4.2.1 and Fig. 4-1).

13. General Comment, Section 4. The RI/FS concludes that there are no hot spots of PCB in the sediments (RI section 4). The sample design implemented is not likely to detect hot spots. Transect surveys are highly correlated within transects but completely uncorrelated across transects. This correlation can only detect hot spots that run across the channel, which is not as likely due to the flow dynamics of the stream. Additional samples would need to be taken both up and downstream to determine the extent of contamination. Essentially, the conclusion that there are no hot spots may be entirely a direct result of the sample design, whereas the presence or location of hot spots can not be determined at this time with the data available.
14. Page 4-1. The RI/FS is also somewhat contradictory in its assertion that the impoundments and former impoundments are acting as a sediment trap and accumulating the majority of the PCB mass (RI page 4-1). This could be interpreted that the impoundment sediments are essentially hotspots. Additionally, the reporting of SWAC for each stretch of the river vary from 0.43 ppm to 4.8 ppm (RI 4-12) suggesting hot areas if not specific hot spots.

The significance of the determination of hotspots is that removal and/or capping volumes and cost estimates will depend on whether clean-up is of the entire system or limited to specific areas where PCB concentrations are highest. The RI/FS conclusion, based on no hot spots and subsequent removal of all sediments (FS section 2), should be re-examined to consider clean-up that would be limited to where PCB concentrations are determined to exceed clean-up goals. Alternatively, a focused clean-up can be implemented to remove the highest concentrations of contaminated sediment to reduce the surface

concentration and remove a substantial percentage of the PCB mass.

15. Page 4-2, floodplain soils. How are floodplain soils defined/distinguished from exposed sediments?
16. Page 4-2, box entitled "Why Include Morrow Lake?" Without a quantification of levels of PCBs in Morrow Lake, it isn't possible to evaluate the need to include it in the cleanup of the river.
17. Page 4-3, The RI states that "with the concurrence of the MDNR, floodplain areas outside of the former impoundments were eliminated as an issue of concern along the Kalamazoo River (Cornelius, 1994)." Even if the floodplain areas outside the former impoundments presented little to no risk to human health, as stated in the RI, has the potential terrestrial threat from these floodplain soils been adequately examined?
18. Page 4-8, TOC in exposed sediment. Jim Chapman - the range of TOC is LARGE! Is this normal?
19. Pages 4-10, 4-11, For clarity, the discussion of the sediment results between Morrow Dam and Lake Allegan should also state that 53 % of the surficial samples exceeded 1 mg/kg PCB, as did 16 % of the subsurface samples.

Similarly, 26% of the combined surface and subsurface data set exceeded 1 mg/kg PCB, although the calculation is biased because the totals include duplicate analytical results for 14% of the subsurface samples, but only 0.3% of the surficial samples. The total percentages should be recalculated excluding the duplicate samples.

For clarity, the discussion of the sediment results in Portage Creek downstream of Alcott Dam should also state that 57% of the surficial samples exceeded 1 mg/kg PCB, as did 81% of the subsurface samples.

20. Page 4-12, table of SWAC values. Do we have enough data points to do a reasonable SWAC analysis?
21. Page 4-17, "PCB is most strongly correlated to sediment depth in the Kalamazoo River downstream of Trowbridge Dam. ... Table 4-2 demonstrates that the highest, most statistically significant correlations occur in these downstream reaches ..."

Even the strongest correlation between sediment depth and PCBs in Table 4-2 explains only one-third of the variability in sediment PCB concentration over a reach. Over all reaches, sediment depth explains less than 20% of the variability.

24. Page 4-17, "Together these data demonstrate two important points. First, remedial

alternatives targeting removal of the highest PCB concentrations would by necessity target the deepest, highest-volume deposits of sediment."

This point is not supported by the low coefficient of determination (r^2) for the regression between sediment depth and PCB concentration reported in Table 4-2.

25. Page 4-22, p. 4-22. "The overall [multivariate regression] models show strong predictive capabilities for identifying areas most likely to have accumulations of PCB in the sediment."

While the model performs impressively well for surficial sediments in Allegan City Impoundment ($r^2 = 0.87$), and acceptably well for surficial sediments for Trowbridge Dam to Allegan City Line and all samples in Former Trowbridge Impoundment ($r^2 = 0.61$ and 0.64 , respectively), at all remaining reaches and depths, the model explains less than 50 % of the variability in sediment PCB concentration. Across all reaches and depths, the multivariate regression model explains only about one-third of the variability in sediment PCB concentration.

26. Page 4-27, For clarity, the discussion of the focused floodplain results should also state that 27 % of the samples exceeded 1 mg/kg PCB.

27. Page 4-29, "To directly compare results between surveys, data were stratified by geographical area and TOC so that only surface samples from similar areas of Lake Allegan with TOC greater than 6% were used. ... The 2000 samples have a lower arithmetic average concentration (51 mg/kg) than was observed in the data collected in 1994 (68 mg/kg)."

The statistical significance of the difference should be reported. Since the results of a statistical comparison are not mentioned, but are described for most other comparisons made in the RI, it appears that the difference in the average surficial concentrations of the censored 1994 and 2000 Lake Allegan is not statistically significant. The full and censored data sets should be provided for 1994 and 2000 so that the data censoring process may be reviewed.

28. Page 4-31, For clarity, the discussion of the Otsego City Impoundment results should also state that 43% of the samples exceeded 1 mg/kg PCB.
29. Page 4-39, "Results of a regression analysis show that a significant relationship exists between flow and the ratio of non-1242 congeners to total PCB in the particulate phase ($r^2=0.20$, $p<0.01$)."

The "significant relationship" accounts for only one-fifth of the variability, therefore four-fifths of the variability is not linearly related to flow.

30. Page 4-39, "Non-Aroclor 1242 congeners represent the subset of the theoretically possible 209 congeners that are specifically not associated with the commercial Aroclor 1242 mixture (Schultz et al., 1989)."

Lack of detection of a congener in Aroclor 1242 in Schultz, et al. (1989) is not proof that the congener is not present in Aroclor 1242. The analytical methods used by Schultz, et al., resulted in a reportable detection limit of 0.05 % (500 ppm) of pure Aroclor. Analyses performed with lower detection limits will report a larger number of congeners present. For example, Hong, et al. (1993) analyzed various Aroclors for coplanar congeners with a detection limit of 0.5 ppm (0.00005 %) of pure Aroclor. Most (75 %) of the eight coplanar congeners reported as non-detects in Aroclor 1242 by Schultz, et al., were detected in Aroclor 1242 by Hong, et al. Three of these congeners occur in concentrations just below the Schultz, et al. detection limit (congeners 81, 123, and 114), and the remaining three are present in Aroclor 1242 at about one-tenth of the Schultz, et al. detection limit (congeners 126, 157, and 167). Since it is not known how many of the other congeners reported as non-detects in Aroclor 1242 by Schultz, et al., may actually occur in Aroclor 1242 at concentrations below the Schultz, et al., detection limit, the attempt to allocate "non-Aroclor 1242" congeners is not scientifically defensible.

Hong, C., B. Bush, J. Xiao, and H. Qiao. 1993. Toxic potential of non-ortho and mono-ortho coplanar polychlorinated biphenyls in Aroclors®, seals, and humans. Arch Environ Contam Toxicol 25: 118-123.

31. Page 4-40, last para. I fail to see the "peak" in Figure 4-31.
32. Page 4-42, first para in section 4.5.2.3. Does the fact that there was no meaningful correlation between PCB and TSS in the river indicate that the statistical analysis isn't calibrated in reality, or that the data set isn't good (robust) enough to show the correlation?
33. Page 4-43, Multivariate Regression Analysis. How does this discussion facilitate the Agencies in making a cleanup decision for the river?
34. Page 4-44, Figure 4-23 shows a large decline in surface water PCB concentrations between 1985/88 and 1994, but there is not a consistent trend between 1994 and 1999/2000 data. The decreases observed between the mid-80s and 90s appear to have reached an asymptote by the mid-90s.
35. Page 4-46, PCB in Fish. The text states that fish were collected in 1999 using the same sampling and analysis protocols as in 1993 and 1997. Explain in detail what these protocols were. Also, explain why MDEQ was not given the opportunity to oversee the 1999 fish collection as they had in 1993 and 1997.

36. Page 4-47, last sentence in first partial para. "The vast majority of fish collected from the river in 1993 were free of external abnormalities and in good health." Figure 4-32 indicates the PCB levels in fish were very high, thus making the conclusion that these fish are in "good health" somewhat comical. Please revise that statement to delete the statement regarding good health.
37. Page 4-48, "... the mean wet-weight PCB concentration in smallmouth bass from Morrow Lake was 20% to 24% of those at downstream locations."

Change "20%" to 10 % (calculated from Table 4-7).

38. Page 4-48, "Morrow Lake fish concentrations more closely resemble the downstream locations ..."

Actually, when compared on a consistent basis (upstream concentration as a percentage of the downstream concentration), the data show that Morrow Lake fish concentrations more closely resemble Battle Creek than the downstream locations (based on Table 4-7). For smallmouth bass fillets, the wet-weight and lipid-adjusted concentrations at Battle Creek are 43 and 42 % of the levels at Morrow Lake. In contrast, the Morrow Lake concentrations are only 10-24 and 11-21 % of the respective concentrations at downstream locations. For carp fillets, the wet-weight concentration at Battle Creek is 34% of that at Morrow Lake, and the Morrow Lake concentration is 4, 6 and 36 % of the downstream locations included in Table 4-7. Therefore, on a wet-weight basis, the PCB concentration in Morrow Lake carp is more similar to Battle Creek as compared with two downstream reaches, but, for a third reach, concentrations increase by a similar multiplier from Battle Creek to Morrow Lake to Lake Allegan. Even in the latter case, it cannot be claimed that Morrow Lake is more similar to Allegan than to Battle Creek. The only comparison that shows an increased similarity between Morrow Lake and downstream is for lipid-adjusted PCB concentrations in carp fillets: Battle Creek is 20 % of Morrow Lake, and Morrow Lake is 36 to 62% of downstream locations. Since both measures of PCB concentration in smallmouth bass show a closer similarity between Morrow Lake and Battle Creek, and the two carp measures show conflicting results, there appears to be a stronger case against the statement that "Morrow Lake fish concentrations more closely resemble the downstream locations" than in support of it.

39. Page 4-52, in the discussion of PCB in Terrestrial Biota the RI claims that "PCB levels in both mice and earthworms collected from the exposed sediments of the former Trowbridge and Plainwell impoundments were substantially lower than the levels of PCB found in soils at the same locations shown in the table below." Is it really relevant that PCBs in soils are less than PCBs in earthworms? The only real issue seems to be what the level of PCBs in earthworms (2.6 mg/kg at Trowbridge), is doing to the earthworm itself and its predators.

In short, the entire terrestrial risk appears to have been significantly downplayed in this RI.

40. Page 4-52, "PCB levels in both mice and earthworms ... were substantially lower than the levels of PCB found in soils at the same locations shown in the table below." ... "Mice and earthworms were found to be accumulating relatively little PCB. In the exposed sediments of the MDNR-owned former impoundments, mice and earthworm PCB concentrations were approximately 1 percent and 10 percent of the PCB levels in the soil ..."

The comparisons are distorted by the inconsistent basis of the concentrations reported for the different media: dry weight in soil vs. wet weight in biota (earthworms and mice). Unfortunately, the Draft Technical Memorandum 14 (BBL 1994) that reported the earthworm and mouse analytical results did not report moisture content. To compare soil and biota on a consistent basis, the dry-weight concentrations for biota may be calculated based on mean moisture contents of 84 and 68% for earthworms and small mammals, respectively (Table 4.1 in USEPA 1993). The corresponding dry-weight PCB concentrations are 16, 12 and 2.9 mg/kg for earthworm; and 0.38, 0.81 and 0.29 mg/kg for mice at TBSA 3, 5 and 10, respectively. When corrected for moisture content, the dry-weight PCB concentrations in the depurated earthworm tissue are relatively close to the concentrations in the associated soils (40 to 70% of the soil concentration on a dw/dw basis, compared to 7 to 10 % on a ww/dw basis). Therefore, at this site, on a consistent dry-weight basis, PCB concentrations are comparable in earthworms and soil. Concentrations in mice are lower than the associated soil levels (2 to 4% of the soil concentration on a dw/dw basis), but, on a consistent dry-weight basis, the difference is about 4-fold less than shown in the RI (0.5 to 1% on a ww/dw basis).

USEPA. 1993. Wildlife Exposure Factors Handbook. vol. I. Office of Research and Development. EPA/600/R-93/187a.

The statement that "earthworms were found to be accumulating relatively little PCB" is incorrect as discussed above. The percentage comparisons of biota and soil PCB concentrations in the box on p. 4-52 should be changed from 1 % for mice to 4%, and from 10% for earthworms to "as much as 70%".

41. Page 4-53, first para. What are the KRSG sources that have or soon will be controlled? I assume you are referring to the landfills and the mills. What about all the KRSG waste that is in the river? The text states that the predominant known external source of PCB to the river today is the erodible riverbank created by the MDNR's operation of its 3 dams. These erodible riverbanks are KRSG waste, not MDNR waste. And they really aren't a "source," since this waste has been in the river ever since the KRSG facilities discharged it to the river. Another view would be that the MDNR's operation of their dams removed significant amounts of KRSG waste from the river system, since now significant amounts

of the waste are exposed sediments instead of submerged. Either way, there is way too much time spent in the report pointing fingers, and instead of trying to find someone to blame, we'd be better off spending our time finding a solution to the problem.

42. Page 4-53, section 4.7.1. There is no recognition here again that the waste that the KRSG mills discharged to the river is the responsibility of the KRSG.
43. Page 4-54, Georgia-Pacific Mill. Brian, how did the state set the cleanup number at 9.9 ppm?
44. Page 4-55, King Street Storm Sewer. Brian, the ROD didn't have a cleanup goal, so why did the AOC have one of 1 ppm?
45. Page 4-55, last para. "...MHI financed a removal action..." This is only partly accurate. MHI cashed out for less than the removal actually cost, so EPA financed a portion of the removal action.
46. Inside Section 5 - Box entitled "Trend Analyses" and "Transport of PCB is Declining." EPA does not agree that fish tissue data supports the statement that "PCB concentrations in fish are being reduced by half every 3 to 15 years." Our analysis of fish tissue concentrations shows that there was a decline in tissue concentrations between the 1980's and 1990's, but no reduction since then. On a lipid normalized basis, fish tissue concentrations have stabilized in the upper part of the river, and levels are increasing in fish tissue in the Saugatuck area. Therefore, EPA sees no evidence of a "steady decline in the amount of bioavailable PCB over the past two decades." These statements should be deleted from the RI Report.
47. Section 5, page 1: Why is the estimate for the reduction of PCBs in surface sediment and fish so broad? The RI estimates that PCB concentrations in fish are being reduced by half every "3 to 15 years." Can this number be calculated with any further degree of certainty?
48. Page 5-5 and elsewhere: The document at various points uses intuition, rather than facts, to make conclusions. For example, in the discussion of erosion from the "MDNR-owned former impoundments," the document states: "[I]ntuitively reasonable estimate of bank loss in these areas yield a magnitude of annual PCB loading of 10 to 100 mg kg to the river." Intuition will not help U.S. EPA win a challenge to the selected remedy.

The RI states that quantitative estimates of erosion are contained in the Supplement. MDEQ must be advised to either approve or disapprove the Supplement, so that we can know if the quantitative estimates are reliable and a government-sanctioned part of the Administrative Record.

49. Page 5-6, "As noted below, data from each of these media [sediment, surface water, and fish] indicate that the transport and bioavailability of PCB in the Kalamazoo River have been declining steadily over the past two decades."

As noted above and below, the declining trend appears to have tapered off to no discernible trend for approximately the last decade.

50. Page 5-6, The discussion of the mechanisms of natural attenuation is incomplete. Additional "attenuation" processes include downstream transport of contaminated sediments, partitioning of sediment PCBs to surface water, and volatilization of PCBs from the site. These processes result in distribution of PCBs to other components of the environment--Lake Michigan and the atmosphere.
51. Page 5-7, third bullet. Specify at what locations the KRSRG believes fish consumption advisories can be relaxed or eliminated.
52. Page 5-8, The half-time estimates for sediment PCB in Allegan City Impoundment (6.5-14 y) and Kalamazoo Lake (3.5-4.8 y) are not valid for projecting future trends because the calculations mainly reflect the large decreases between the mid-1970s and the mid-1980s. Sediment concentrations are essentially stable between the mid-1980s and mid-1990s in three of the five sediment cores depicted in Figures 5-2 and 5-3. The remaining two sediment cores (AL2-4 and KL2-4) show slow decreases following the mid-1980s, greatly reduced from the large decreases over the previous 10-year period. For a valid estimate of a sediment PCB half-time applicable to the foreseeable future, calculations should be separately performed for post-1985 data, that is, after the obvious inflection in the sediment concentration time-trend that shows a dramatic change in the rate of change of sediment contamination.
53. Page 5-9, Section 5.2.2 Surface Water Trend Analysis. Again, the trends should be interpreted with caution. Comparison of the average surface water PCB concentrations shown in Figure 4-23 reveals large changes between the 1980s and mid-1990s, but much smaller changes between 1994 and 1999/2000. Also, the direction of change for 1994 and 1999/2000 comparisons are inconsistent over different river distances.
54. Page 5-11, Section 5.2.3. 5.2.3 Fish Trend Analysis. The fish trend analyses emphasized in the RI are flawed because they rely on wet-weight data. As discussed elsewhere in the RI, lipid adjustment is commonly used for assessing fish PCB trends (Sections 4.6.1.1), and "may be more sensitive than wet-weight PCB concentrations when monitoring potential trends in PCB bioavailability" since the "variability of PCB per unit lipid are [sic] almost always less than that of wet-weight PCB concentration"(Section 4.6.1.4). The fish wet-weight PCB concentration trends shown in Figures 5-6 through 5-7 are confounded by large changes in fish lipid content between sampling events.

The lipid adjusted data show no attenuation, and even some increases, in PCB concentrations in carp and smallmouth bass fillets between 1993 and 1997 at ABSA 5 and 9 (Plainwell and Allegan). In marked contrast, the lipid-adjusted concentrations in both species decreased over the same time period at ABSA 2 (Morrow Lake), upstream of the site. Carp and smallmouth bass show conflicting trends at ABSA 11 (Saugatuck)—decreasing and substantially increasing, respectively. The 1999 lipid adjusted fish data show the same trends at the same locations with a single exception—instead of an increase of 8% in smallmouth bass lipid-adjusted PCB concentrations at Plainwell between 1993 and 1997, the 1999 data show a decrease of 13% from 1993. A reasonable interpretation of the Plainwell data is that smallmouth bass lipid-adjusted PCB concentrations have fluctuated within a narrow range of values since the early 1990s. This interpretation is consistent with the static trend for carp at Plainwell, and the static or increasing trends for smallmouth bass and carp at Allegan.

The wet-weight focus of the RI contrasts with the fish trend analysis presented by BBL (1994) Draft Technical Memorandum 14, Biota Investigation, vol. 1, which focused on lipid-adjusted PCB concentration trends. As discussed in BBL (1994), "The scientific literature as well as historical data from the Kalamazoo River indicate that lipid-normalized PCB concentrations provide a better means of evaluating PCB trends in resident fish populations than wet-weight PCB concentrations". If the figures showing lipid-normalized trends in BBL (1994) are supplemented with 1997 and 1999 lipid-normalized data, the PCB levels in smallmouth bass and carp fillets show substantial decreases between the 1980s and early 1990s, but no appreciable decreases between the early and late 1990s. Therefore, based on lipid-normalized fish data, there has been little or no attenuation of the bioavailability of PCBs in the Kalamazoo River since the early 1990s.

55. Page 5-12, "These trends were examined for smallmouth bass less than 16 inches and carp less than or equal to 22 inches in length. These size restrictions provide a more consistent historical size class and reduces the potentially confounding effects of the positive correlation between fish size and PCB concentration."

In nearly all locations, fish length explained less (often substantially less) of the variation in fish PCB concentrations as compared with lipid content. This is the case for both carp and smallmouth bass in both 1993 and 1997 (see coefficients of determination in Tables 4-8 and 4-9). As discussed in Section 4.6.1.4, "lipid concentration is more strongly correlated with total PCB concentrations in fish than the other parameters". This does not support the approach taken in the RI to control for fish length and focus on wet-weight concentration for analyzing PCB trends in fish while neglecting lipid content.

56. Page 5-13, "...sediment and caged-fish monitoring data strongly support the conclusion that PCB bioavailability has been diminishing downstream of Lake Allegan. ... Consequently, the calculated half-times for New Richmond carp fillets apparently would

underestimate the overall rate of decline of PCB in fish downstream of Lake Allegan."

As discussed above, sediment data do not support the conclusion that PCB bioavailability has continued to decrease through the 1990s. The caged-fish data are presented on a wet-weight basis in Figure 5-10, and therefore the trend may be confounded with changes in lipid content. Saugatuck smallmouth bass fillet data show substantial increases in lipid-normalized PCB concentration between 1993 and 1997 or 1999 (+256 or 103 %, respectively). Even if the two highest 1997 smallmouth bass PCB values are excluded as potential outliers, lipid-normalized PCB concentrations increased 61 % at Saugatuck between 1993 and 1997. Saugatuck lipid-normalized carp fillet data show decreases of 13 or 20 % between 1993 and 1997 or 1999, respectively, so the evidence concerning the trend in PCB bioavailability downstream of Lake Allegan is contradictory and therefore equivocal.

57. How confident is U.S. EPA about the results of the PRPs' erosion study? Page 5-24 of the RI states that the results of "a very preliminary assessment of erosion potential" indicates that net sediment deposition may not be occurring in several sediment beds upstream of Lake Allegan. Does this statement signify that natural attenuation of the riverbed may not occur, because of the "dynamic equilibrium" that has been reached in the River? Or does it mean that PCB transport is likely to slow down as a result of the slowing of sediment deposition? Has the erosion study been completed?
58. Page 5-25 numbers 1-6: Jim Chapman, would you give a brief counterpoint to each of these 6 conclusions? Thanks.
59. Inside Section 6 - Risk Assessment. (1) The boxes on this page only address human health (HH) risk, not ecological (eco) risk, yet the title of the section is "risk assessment." Please clarify. (2) First box, first bullet: insert "complete" before "exposure pathways exist" (3) Second box, title: insert "significant" before "risk" (4) Third box re: fish advisories. Contaminants of concern - Hg is mentioned but not really considered in the risk assessment, clarify. (5) Fourth box re: PCB levels in fish. Which/how many species are really clean? Have advisories actually been lifted? . . .
60. Page 6-1, section summary box. (1) second bullet. Add "significant" before "risk." There is never a zero risk as implied by this bullet. (2) fourth bullet. EPA disagrees that current data is insufficient to find risk to terrestrial animals (JIM CHAPMAN) (3) First para under bullets. Please cite which general population study you are referring to.
61. Page 6-2, first sentence under section 6.1. Replace "single pathway" with "principal pathway."
62. Page 6-3, bullets. Cite actual risk numbers.

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63. Page 6-4, second bullet. Clarify, is it maximum EPCs or average EPCs.
64. Page 6-8, Eco Risk Assessment. Jim Chapman, would you briefly comment on this section?
65. Page 7-1, Section 7-2. How is "surface sediment" defined and how do you know that below that is not bioavailable?
66. Page 7-2, second para, third sentence. Cite to some examples where this is true.
67. Page 7-3, section 7.3. Bioavailable zone is one thing, however impact of pore water on surface water concentrations needs to be discussed. This was the major exposure pathway to fish at Pine River, where the most highly contaminated sediments were not at the surface, but the pore water diffusing into surface water acted as a continuing source of DDT to fish (Jim Chapman - help!).
68. Page 7-5, fourth para. Lipid-normalized fish tissue data indicates that natural attenuation is not reducing levels of PCB in fish tissue over the last decade.
69. Page 7-7, third para. What is the uptake mechanism for the fish? Exposure to PCB in water column, eating contaminated detritus, exposure to contaminated surface sediment?
70. Page 7-9, Summary. This section states that fish and surface water show declines in PCB concentration. What about surficial sediment? KRSG's whole argument is that the concentrations in 0-2" of sediment controls the levels in fish tissue.
71. The PRPs' attack on the state does not end with their liability claim. At pg. 7-9 of the RI, the PRPs claim that if the state would only work harder, additional sources of PCB to the River could and would be found. The RI States:

The presence of current uncontrolled discharges of PCB to the Kalamazoo River is an important source of uncertainty pertaining to the ultimate fate and transport of PCB and the response of the river media to remedial actions. Where evidence of continued discharge of PCB has been investigated, the findings suggest that a comprehensive investigation by the State would indeed uncover remaining PCB sources to the river.

Under CERCLA, the PRPs have every opportunity to investigate and recover from other responsible parties. The burden does not belong to the State. This language should be deleted.
72. Page 7-10, para before section 7.5. "So while large PCB reserves exist in each, only the banks of the former...." It seems obvious that this is a false statement. At Pine River

there was no bank erosion, and natural attenuation still did not fix the problem. Its quite presumptuous to assume that but for the bank erosion there would be no problem in the Kalamazoo River today.

73. Page 7-10, Section 7.5 Remedial Response Objectives (RRO's). EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final dated October 1988 discusses the development of Remedial Action Objectives (RAOs) on page 4-7. I believe that the KRSG's RROs are meant to be what our guidance calls RAOs. The guidance states that "RAOs consist of medium-specific or operable unit-specific goals for protecting human health and the environment. The objectives should be as specific as possible but not so specific that the range of alternatives that can be developed is unduly limited... Remedial action objectives aimed at protecting human health and the environment should specify; the contaminants of concern; exposure routes and receptors; an acceptable contaminant level or range of levels for each exposure route (i.e., a preliminary remediation goal). Remedial action objectives for protecting human receptors should express both a contaminant level and an exposure route..."

The RROs that the KRSG propose on page 7-10 of the Draft RI Report do not comply with EPA's guidance since they do not specify a contaminant level nor an exposure route. The primary RRO set forth by the KRSG is to "Reduce PCB concentrations in Kalamazoo River Fish tissue to acceptable levels in terms of human and ecological risk." This RRO needs to state what the "acceptable levels" are to protect human and ecological receptors. For reference, I am attaching the Remediation Objectives from the Sheboygan River and Harbor Record of Decision (ROD).

74. Appendices A-M - Brian, I perused them, but didn't review thoroughly and therefore have no comments.

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75. Page 1-1, ¶ 2: The statement of the purpose is incomplete and incorrect. The language of this paragraph should track 40 C.F.R. § 300.430(e)(1). Delete the phrase beginning with "identify and evaluate" and insert the following:

ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to the State of Michigan for appropriate remedy selection. The NCP provides the criteria under which remedial action alternatives will be evaluated in this document. The criteria of: (1) overall protection of human health and the environment; and (2) compliance with ARARs, are "threshold criteria" which each alternative must meet in order to be eligible for selection.

76. Page 1-2, first para. States the FS is consistent with the NCP and CERCLA - *Elleen, do we agree with this?*

77. Page 1-4, The FS, like the RI, is replete with vague and not-so-vague language directing blame at MDNR. For example, on page 1-4, the FS states as follows:

This FS assumes that all dams and impoundments . . . will continue to be operated and maintained in compliance with applicable laws and regulations (including State laws that regulate dam safety and maintenance, and prohibit the exacerbation of existing environmental contamination) . . .

All such language should be deleted.

78. Page 1-4, Section 1.3.1. "This FS assumes that all dams and impoundments along the river are and will continue to be operated and maintained..." This may be an incorrect assumption. The KRSG should consult with all the dam owners to determine if this is the case or not.

79. Page 1-5, Pathways to be Addressed. The terrestrial exposure pathway is also significant, see the revised eco risk assessment.

80. Page 1-5, last para. The discussion re: bioavailability is not complete. The paragraph mentions that bioavailability must be considered, but the discussion then abruptly turns to transport. Please complete the discussion of bioavailability.

I'm not convinced that transport is our exposure pathway of greatest concern. Can the transport pathway be quantified to lend credibility to this argument?

Why are the exposed sediments referred to as an "external source of PCB to the river."

81. Page 1-6, top line on the page. "During flooding, these (exposed sediments) may be areas for net deposition." Can this be quantified? Why is it more likely that these areas would be depositional instead of erosional during flooding?

82. Inside Section 2 - box regarding hot spots. The box states that since no hot spots have been identified the entire Site must be considered when evaluating remedial alternatives. However, the data set we currently have is incapable of identifying hot spots, therefore the conclusion that there are none is unsupportable. EPA believes it would be more appropriate to evaluate remedial alternatives for each reach of the river. Reaches have already been defined on page 1-9 of the RI Report and again on page 1-4 of the FS Report.

83. Pg. 2-1: The FS discusses "hypothetical" subsistence anglers. I thought MDEQ was

aware of the existence of subsistence anglers in this area of Michigan.

84. Page 2-2, Identification of ARARs.

Federal Chemical-Specific ARARs and TBCs:

- n. The relatively new PCB Remediation Waste Rule, 40 C.F.R. § 761.61 should be added as an ARAR to this list.
- o. TSCA's chemical waste landfill requirements, 40 C.F.R. § 761.75 should be added as a TBC to this list.
- p. Consistent with the Sheboygan River ROD, the Water Quality Criteria for the Great Lakes System, 40 C.F.R. § 132, should be designated a TBC, not an ARAR.
- q. Since the Michigan water quality standards are more stringent than U.S. EPA's, the more stringent state requirements will comprise the ARAR or TBC. The determination of whether the Michigan surface water quality standards are ARARs or TBCs will depend on a number of factors. First, if the Michigan standards (which I assume were established under the Clean Water Act) are goals rather than requirements, the surface water standards will be TBCs. Next, even if the Michigan standards are requirements, it appears that, to comply with the NCP, MDEQ must make an independent determination that the surface water quality standards are "relevant and appropriate under the circumstances of the release." See 40 C.F.R. § 300.430(e)(2)(i)(E). See Discussion of ARARs/TBCs in Sheboygan River ROD.

Federal Action/Location Specific ARARs and TBCs

- r. The new Science Advisory Board report on the effectiveness of dredging PCBs in river systems should be added as a TBC to this list.
- s. Executive Orders 11990 and 11988 regarding protection of wetlands and floodplain should be designated as ARARs, not TBCs.
- t. The Clean Air Act should be designated an ARAR, not a TBC.
- u. The Endangered Species Act should be designated an ARAR, not a TBC.
- v. It is unclear to me whether the Federal Power Act of 1920 is at all relevant to any of the remedial alternatives under consideration. None of the dams is still used to generate hydroelectric power, so are they still subject to federal permit requirements and regulations? If the answer is no, then this citation should be deleted from the list.

85. Page 2-2: The document should include here a discussion of the state-enforcement lead nature of this Site. Language similar to the following should be added:

The Allied Paper/Portage Creek/Kalamazoo River Superfund Site has been

designated as State-Enforcement-Lead by agreement of MDEQ and U.S. EPA. Such a designation signifies that the response activities at the Site are being conducted by the KRSG, pursuant to Michigan state enforcement authorities. MDEQ may select a remedy at this Site without U.S. EPA's approval. Nevertheless, in order to avoid any possible duplication of effort, or additional cleanup under federal authorities, the KRSG has conducted the RI/FS in a manner they believe is consistent with the provisions of the NCP.

86. Page 2-2, ¶ 4: After the phrase "statutory or regulatory requirements," the document should include the following sentence:
- Under the NCP, when federal and state regulations provide different standards for the same contaminant, federal standards become the ARAR unless the state standard is more stringent.
87. Page 2-4: I would suggest that another "ancillary" RRO for the Site is reduction of PCB concentrations in exposed and underwater sediments.
88. Page 2-4, RROs and GRAs - General Comment. Same comment as above re: RROs in the RI Report (see comment # ——— above).
89. Page 2-5, third full ¶: This whole discussion pertains to setting "realistic" remedial action objectives. Much of the information appears self-serving and irrelevant to the FS, and should be deleted.
90. Page 2-6, In-Place Containment. "Ongoing deposition of cleaner material" would be considered to be natural attenuation, not capping. Same goes for in-situ biodegradation of PCBs in sediments.
91. Page 2-8, last sentence of first para. "PCB from external sources...are more bioavailable upon entry to the river than PCB already in the river...". What evidence do we have to support this?
92. Page 2-8, fourth para. Define what is meant by "surface sediment." Also, cite the "scientific literature" that is referenced in this paragraph.
93. Page 2-9, first full para. **Jim Chapman - do you agree with this???** I'm not sure we can conclude this without the FIELDS analysis.
94. Page 2-9, second and third bullets. These 2 appear to be the same.
95. Page 2-9, last para. **Jim Chapman - is this how EPA would approach this?**

96. Page 2-11, middle para. This para states that PCB loading from the banks of the MDNR-owned former impoundments contributes between 10 and 100 kg of PCB annually to the Kalamazoo River. How was this range of numbers estimated? Please reference where the calculation is. In the next paragraph on page 2-11 it states that riverbank deposits "cannot be empirically determined with high accuracy based on existing data." Why not? The para goes on to state that "Although other external PCB loading is expected to be comparatively small, the exact proportion of current measured transport that is attributable to these sources is unknown." So basically, I read this to mean we have no confidence in the riverbank loading estimates, yet the RI concludes that riverbank loading is driving risk at the site (as the major source). How can the PRPs conclude this?
97. Page 2-12, First para. "...surface sediments (0-2 inches)..." Are all references to "surface sediments" in this report defined as 0-2 inches? How was this definition of "surface sediments" selected, and how is it justified?
98. Page 2-12, second para. "The ability of upstream reaches to recontaminate the surface of an actively remediated reach is suggested by the comparable magnitude of annual transport and PCB mass contained in surface sediments." Based on the discussion on page 2-11, the annual transport of PCB is unknown, so this conclusion seems unsupportable.
99. Page 2-14, last sentence. "At this level of analysis the results also leave open the possibility that PCB transport from Morrow Lake could undermine downstream remediation if transport does not diminish over time." It seems that the PRPs whole argument is that active remediation would be undermined by continuing transport, but there isn't enough data to quantitatively support this conclusion, therefore it's all conjecture. What additional data do we need to quantify this?
100. According to EPA's RI/FS guidance (pages 4-15, 4-16), the first step in evaluating remedial technologies is based on technical implementability.
101. Page 3-2, ¶ 4: This paragraph states, in relevant part:

Technologies and process options that may be applied to the exposed sediments in the former impoundments are not identified on this table because . . . these areas have not been conclusively determined to pose a risk, and the remedial management of the exposed sediments is not necessary to address the established RROs. (Remedial technologies for these areas are appropriate presented in the development of remedial alternatives in subsequent sections of this FS.)

I have several problems with this paragraph. First, "conclusive determination" is never possible. If the eco-risk assessment concludes that, in all likelihood, the exposed

sediments present a terrestrial risk above an acceptable level, then the FS must present a remedial option for this media. Next, by refusing to establish an RRO dealing with the exposed sediments, the KRSG has conveniently created a situation where they need not address contaminated sediments. Finally, I can find no place later in this FS where remedial alternatives for exposed sediments are developed.

102. Page 3-2, last para. Table 3-2 will need to be updated to include exposed sediments since the revised ecological risk assessment report finds there to be unacceptable risk.
103. Page 3-3, **Effectiveness**. Here and everywhere else where EPA guidance is referenced: Please quote the guidance verbatim. The four bullet points in the draft FS do not reflect the three points the guidance (on page 4-16) state should be considered.
104. Page 3-5, last para. "The sloughing of these sediments into the river represents the largest identified current external source of PCB to the Kalamazoo River." Maybe this is true, but the statement is meaningless until it is quantified so the *significance* of the impact can be determined.
105. Page 3-6, second para in Section 3.3.3. It should be noted that fish advisories are not very effective for humans and not at all effective on wildlife.
106. Page 3-6, second para in Section 3.3.3. "Pool elevation controls, which are in practice at some locations, would be implemented by the dam owners..." Since the PRP group has no control over what the dam owners will do, this cannot be a part of a remedy unless the PRP group buys the dams in question or otherwise form agreements with the dam owners to follow the PRP group's plan. This seems unlikely, however, since the State has indicated that they intend to remove the State-owned dams. I suggest this assumption of pool elevation controls be deleted.
107. Page 3-7, ¶ 3: This discussion of dispersion needs to be significantly modified. Without additional information, it is impossible to know whether the remedy EPA has selected at other locations is relevant at all to remedy selection at this Site.
108. Page 3-8, ¶ 2: The reference and lengthy quotation from EPA's Contaminated Sediment Strategy (1998) should be deleted. The key phrase in the quote is "Where short-term and long-term risks and effects are determined to be acceptable." Such is not the case at this Site. Furthermore, as stated above, without additional information, the references to EPA's selection of natural attenuation at other Superfund sites should be deleted.
109. Page 3-8, quote from the Contaminated Sediment Management Strategy. This quote should be deleted since it is inapplicable to this site. Short and long-term risks are *not* acceptable *and* there is a statute that requires remediation.

110. Page 3-9, first sentence. Natural sedimentation is not a capping alternative, it is a No Action alternative, please delete it from the capping list.
111. Page 3-9, first para. "...PCB availability at the surface." How is "surface" defined? 0-2 inches?
112. Page 3-9, reference to Figure 3-1. The figure indicates that there is 6 inches of bioturbation and another 12 inches of cap necessary for chemical isolation. This is inconsistent with the rest of the report that says only the top 0-2 inches constitute surface sediments, which are the bioavailable sediments.
113. Page 3-9, fourth para. This paragraph states that construction of a cap would destroy the existing vegetation and benthic communities inhabiting these areas. This would be true for bank stabilization using rip rap also. Include this in the discussion re: bank stabilization with rip-rap.
114. Page 3-9, fourth para. Which areas would be capped? How much area is estimated would need to be capped?
115. Page 3-10, bottom of page. Text says rechannelization and sedimentation basins were not retained, but Table 3-2 shows they were both retained. Please revise to make the text and the Table consistent.
116. Page 3-11, second para. Text states that hydraulic modification would cause severe environmental consequences, including habitat disturbance and destruction of benthic community. This is also true for bank stabilization using rip rap. Add this to the discussion of bank stabilization.
117. Page 3-11, bottom of page. Text says biodegradation of PCB is not being retained, but Table 3-2 shows it is retained. Please clarify. Also Table 3-2 states "some degree" of biodegradation is expected, what degree? The text on page 3-12 indicates it would be of "minor" benefit.
118. Page 3-15. EPA would like to have dry excavation retained. Dry excavation was not retained because "it would be extremely difficult to implement on a large scale throughout the Site." (See page 3-16) This is a vague justification. EPA would like to see remedial alternatives considered on a reach-by-reach basis. EPA does not believe that there is one remedy for the entire river.
119. Page 3-18. The CDF concept is not defined clearly. In my mind, CDF mean a disposal area located in the water body. The CDF proposed here appear to be large landfills not located in the water body, but adjacent to it. Why do you call these disposal areas CDFs instead of landfills?

120. Page 3-18, Residuals Management. Was sand filtration and carbon adsorption used during the time-critical removal at Bryant Mill Pond? Is this why these technologies are proposed here? If not, why were these selected?
121. Page 3-20, Section 3.4 Assembly of Potential Remedial Alternatives. There are several fatal flaws with the 5 assembled alternatives: (1) they address the entire Phase 1 of the river, instead of a more appropriate reach-by-reach approach; (2) the 5 alternatives do not constitute a full array of alternatives as required by the NCP. Several additional alternatives will need to be included including alternatives that consider use of several of the technologies (dredging, capping, bank stabilization, natural attenuation) at discreet locations (or river reaches); (3) the exposed sediments are not addressed in any of the alternatives and need to be included in the remedy evaluation.
- Section 3.4, generally: This whole discussion begs for development of remedial options that would address: (1) exposed sediments (the continuing source of PCB to the River); and (2) underwater sediments impounded behind each of the three dams (the only known "hot spot" areas).
122. Page 3-20, Alternative 1. The "natural attenuation processes" discussed here would include sedimentation and in-situ biodegradation of PCBs.
123. Pg. 3-20, Alternative 2: The FS's discussion of institutional controls/monitoring should be kept separate from any discussion of containment. A containment option would be an engineered option, requiring significant work.
124. Page 3-21, Alternative 3. EPA is concerned that "engineered bank stabilization" will destroy habitat. This is not addressed in the FS. Also, what are the "expected rates" of natural attenuation?
125. Page 3-22, Alternative 5. Removal of all submerged sediments exceeding what level of PCB? Need to state a cleanup goal here. Also, it doesn't appear to EPA that hydraulic dredging would be the best choice for this river considering how shallow the river is.
126. Section 4: This section must identify and explain the "threshold," "balancing," and "modifying" criteria of the NCP. Given the "threshold" criteria of overall protection and ARAR compliance, a good deal of the discussion between pages 4-3 and 4-13 can be eliminated entirely.
127. Section 4. Two important assumptions made in support of natural remediation (with or without bank stabilization) need to be examined.

- 1.) Trends in natural attenuation will continue as they have in the past 20 years (FS 4-16, FS 5-16). Given the recent amount of time since beginning the large scale clean-ups through superfund it is not wise to assume that the status quo is permanent. In fact, one should directly address the question--what if things change in the future? Relatively speaking, sediment deposition cannot go on indefinitely. At some point a stream will alter course and cut through older sediments, redistributing the sediment downstream. The likely end result of channelizing the Kalamazoo River by bank stabilization would, in time, be to flush the contaminated sediments into Lake Michigan. That should not be considered the best (albeit cheaper) alternative. The RI/FS is somewhat contradictory with regards to sediment deposition as a means to reduce PCB concentration at the surface. It seems to simultaneously argue that hotter sediment will ultimately be buried and no longer bio-available but that PCBs can be released from above Morrow Dam creating a confounding "new" source of PCBs (RI 4-2, FS 4-41). One must, I guess, accept that deposition is occurring downstream of Morrow Dam but scour occurring above Morrow Dam. Regardless of the assumptions made it may be best to assume that, since the river is a dynamic system, uniform sediment movement cannot be expected.
- 2.) Removal of the contaminated sediment will be a complete disruption of a natural ecosystem(FS 4-38). First of all, major portions of the Kalamazoo River have been channelized, diverted, diked, and dammed. Returning the system to a natural state is unlikely and is not a primary goal of remediation. What natural areas remain should be a concern in the remediation process, but tempered with the realization that where contamination occurs the benthic organisms that occur there are contaminated as well. Using bank stabilization should not be presented as preserving a natural state or as not destroying habitat or organisms (FS 6-3). Channelization will further affect the benthic community due to changes in flow. Secondly, although sediment removal will create large-scale disruptions to the benthic ecosystem (the true diversity of which is not examined here), the system would not need decades to recover. Since removal operations cannot be accomplished in an instant, it is reasonable to assume that re-population of dredged areas can occur from the edges of a removal site. Evidence to support or refute the rate of re-population of disturbed sites would be useful. Additionally, although the RI/FS suggests that it would be necessary to remove all sediments (since there are no hot spots), it would seem likely that there would be removal areas with clean, and so not dredged, sediments in the same areas.

If sediment is removed from the site to a landfill the RI/FS suggests that, since the PCBs are not destroyed, there is no reduction in mass/volume (FS 4-41). This greatly confuses the issue when making a decision on remediation strategy. Although it may be technically true, the point is, that after removal, the contaminated sediments are contained and eliminated from the system, permanently. No other remediation option adequately

addresses preventing the eventual re-introduction of the PCBs into the system. More importantly, the benefits to removal are direct. Removal of any certain per cent (say 90%-95%) of the PCB mass means that all of that mass is unavailable for bioaccumulation as soon as it is removed, and in the future. The RI/FS lends support to the importance of removing contaminated sediments in its concern over the lowering of the former impoundments. By having changed the patterns of flow in the former impoundments, PCBs have been redistributed, expanding the scope of remediation today (RI section 3). This seems to suggest that if the contaminated sediments had been removed sooner the problem would be less serious, which is a good reason to remove the contaminated sediments now. If not, someone in the future is likely to say, "if they had removed it then we wouldn't have such a big problem now."

128. Page 4-1, CERCLA Evaluation Criteria. Section 4.2 of the Draft FS Report sets forth the CERCLA evaluation criteria. The criteria themselves are stated accurately, however the description of the criteria does not follow EPA's guidance accurately. I would refer the KRSR to page 6-5 and 6-6 of EPA's RI/FS Guidance (cited above) for accurate descriptions of each of the nine criteria. There also is no discussion by the KRSR about the fact that the criteria are separated into 3 categories; threshold criteria (the first 2), primary balancing criteria (the next 5), and modifying criteria (the last 2). These categories reflect that all the criteria are not evaluated equally. This discussion needs to be added Section 4.2 of the FS Report.
129. Page 4-3, Section 4.3. This paragraph states that mathematical models have become a standard part of the RI/FS evaluation of large PCB-contaminated aquatic sites. **EPA disagrees. No modeling was completed at: Pine River, Manistique River, Ford Monroe, Saginaw, others?** Because of the level of effort, and the difficulty in obtaining consensus on input parameters and assumptions, EPA does not believe that mathematical modeling at this Site would necessarily clarify or expedite the decision-making process.
130. Page 4-4, second full para. Evidence of downward trend of fish tissue was questionable. Also, please define "surface sediments (i.e., bioavailable zone)"? Is this 0-2 inches?
131. Page 4-5, second para. The estimated rate of sedimentation. If sloughing ceased (due to bank stabilization or dredging or other remedial action) Then wouldn't depositional rates drop dramatically? Thus essentially eliminating natural sedimentation?
132. Section 4.6: This section is inconsistent as to whether the proposed erosion controls will "prevent," "eliminate" or simply reduce the amount the erosion of exposed sediments into the River. Since the proposed controls could not entirely prevent erosion, words like "mitigate" or "reduce" should be used throughout.
133. Page 4-14, first partial ¶: The 103,000 linear feet of riverbank length was estimated on the basis of PCB concentrations equal to or greater than 1 mg/kg. Since the cleanup level is

likely to be significantly lower than 1 mg/kg, these estimates are inaccurate.

134. Page 4-15, second bullet. Why is access not a problem for bank stabilization, but is considered to be a problem for dredging (esp. mechanical or dry dredging)?
135. Page 4-15, ¶ 1: This discussion should include significantly more details about the type of bank stabilization methods proposed, *i.e.* such a discussion should not be presented entirely within an appendix.
136. Page 4-15, ¶ 1: U.S. EPA evaluated the effectiveness of "Bio-logs" when they were proposed by the PRPs for the Bryant Mill Pond removal. At that time, U.S. EPA believed that such devices would not be effective in preventing erosion of contaminated material into the River.
137. Page 4-17. Brian, Beth stopped reading the FS here because we don't believe one remedy for the entire Phase I of the river is realistic. An analysis by reach would be more appropriate.
138. Page 4-17, first partial ¶: The proposed "monitored natural recovery" of this alternative, no matter how much arguing to the contrary, is indeed a "no action" alternative for the river channel upstream and downstream. The argument to the contrary should be deleted.
139. Page 4-19 (and elsewhere): Is MDEQ willing to waive the ARAR for surface water?
140. Page 4-19, third full ¶: In discussing permit requirements, the FS states that "[i]n lieu of actual permits, the USEPA or the MDNR may specify requirements and procedures that should be followed to protect the environment. The substantive requirements and procedures would be followed to the extent practicable."

Because this Site is a non-Fund-financed-state-enforcement-lead site, the permit exemption provided by Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), does not apply. Accordingly, if the remedial action is selected by the state, and work proceeds under an agreement between MDEQ and the PRPs, the PRPs will have to obtain all necessary permits and comply with all administrative and procedural requirements thereof.
141. Page 4-21: I suspect that this discussion overstates the possible short-term effects of construction, but I defer on this point to others with more expertise.
142. Page 4-27, ¶ 3: Section 121(e) does not codify U.S. EPA policy regarding permit requirements. Again, the language regarding the federal and state agency specifying additional requirements is inaccurate. This language needs to be modified.

143. Page 4-27, final sentence and onto next page: The editorializing about the effectiveness of the proposed capping as compared to bank stabilization is premature. Such statements are appropriate in the comparative analysis of the proposed alternatives, but appear instead throughout the discussions of capping and dredging. Each such statement should be deleted.
144. Page 4-38: It is noteworthy that even the proposed dredging alternative does not include excavation of the exposed sediments. This alternative includes river dredging and bank stabilization.
145. Page 4-39, ¶ 3: It is TSCA's new PCB Remediation Waste Rule that will control disposal of contaminated PCB material, no matter what the concentration level. The discussion regarding TSCA should be modified.
146. Page 4-40: What are the special requirements of Section 404 of the Clean Water Act that cannot be met?
147. Page 4-41, first full ¶: This self-serving argument about the ineffectiveness of dredging should be deleted, particularly in light of the SAB Report. I also question the way the percentages have been presented in this paragraph. The paragraph seems to suggest that, in some cases, dredging has resulted in "a net increase in the average surficial sediment PCB concentration of 75%," which simply cannot be true.
148. Section 5 - Comparative Analysis of Remedial Alternatives. Since none of the presented alternatives address EPA's concerns with the river, I didn't bother to review this section.
149. Page 5-1, ¶ 1: The FS incorrectly states that the NCP evaluation criteria of Agency and community acceptance "are typically evaluated following preparation of the FS and Proposed Plan." These criteria are significant modifying criteria that should be at least initially considered in this document, particularly in light of the strong community involvement at this Site.
150. Page 5-3, first partial ¶: This paragraph refers to the "relatively rapid rate of natural attenuation." Relative to what - other sites? more active remediation?
151. Page 5-3, first full ¶: The suggestion in this paragraph is that there is a direct correlation between reducing PCB contamination in sediments and PCB reduction in fish, *i.e.* that a 50% reduction in PCB in sediments results in a 50% reduction in PCB in fish. Is this accurate?
152. Page 5-7, ¶ 3: The FS states that precautionary measures would be taken for endangered species "in compliance with related ARARs to the extent practicable." The Endangered

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Species Act is an ARAR for this remedial action: the "to the extent practicable" is a removal standard of compliance. The standard must be achieved.

153. Section 6 - It seems that a chain of assumptions, largely based on the lack of presence of hot spots in the sediment, drive the recommendation against sediment removal. The RI/FS preferred remediation is to build erosion control/bank stabilization i.e. rock, rip rap type fill along the shorelines (FS section 6). While this option has many attractive qualities, especially pertaining to the areas of exposed sediment, it does not address the most significant issue with sediment contamination. While having significant short-term effects on bioaccumulation via the present aquatic pathways it does nothing to insure the future reintroduction into the ecosystem due to the natural processes of stream dynamics. Even if, in the time frame of decades, natural processes reduce surface concentration to safe levels, those same processes will, at some point, re-expose contaminated sediments and disperse them throughout the system and into Lake Michigan. (It is, in my opinion, not responsible to future generations to leave contaminants *in situ* in the hope they will take care of themselves. It is also short-sided and arrogant to assume the tendency is for a natural system to clean itself up.)
154. Section 6 - Preferred Remedy. Bank stabilization with natural attenuation for the entire Phase I of the River doesn't adequately address threats to human health and the environment.
155. Appendix D - Site Profiles of Sediment Dredging Projects. Why isn't Pine River in Michigan included in this section?
156. Appendix E - Development of a Sediment Removal. The discussion appears biased against dredging. On page 18, first para, I would agree that conducting a pilot scale study to determine optimal equipment and operational parameters is a good idea. The discussion about losses during removal (pages 18, 19) doesn't balance the fact that removal is a permanent remedy for the source of PCBs in the river. The long-term benefits would most likely far outweigh any short-term risk from release during the removal operations. A very short-sighted discussion.
157. Appendix F - Evaluation of Dam Removal. Page 6. I seriously doubt that mechanical dredging or dry excavation would take longer and be more expensive than hydraulic dredging. At Pine River, hydraulic dredging was clearly the most expensive of the 3 dredging types, with dry excavation coming in as the clear winner for speed to remove and cost. Also, the section on page 6 entitled "community and Agency acceptance" fails to note that the community does not want KRSG's identified preferred alternative in the draft FS, they clearly want removal of the contaminated sediments (in-stream and exposed). In addition, the text fails to note that both Agencies believe that dredging at least of some parts of the river will be a component of a protective remedy for this river, and the information presented in the draft RI/FS has not convinced either Agency to the

contrary.

This Appendix doesn't contain much of an evaluation of the removal of the dams. The discussion of long-term impacts on page 7 is pretty skimpy and not very helpful in evaluating impacts. For example, the text states that dam sill removal will likely cause loss of upstream wetland habitat. How much upstream wetland habitat is there currently? It also states there will be a loss of in-stream benthic and fish habitat. This is misleading, since benthics will re-establish themselves quickly after dredging operations, and therefore wouldn't be a "long-term" impact.

SUPPLEMENT TO RI/FS

158. Appendix S-10 - Probabilistic Risk Analysis.

Highlights of major concerns and EPA disagreements are as follows:

- A. **Work Plan**
 - the PRP did not submit a work plan for EPA approval prior to conducting a probabilistic risk assessment (PRA) at this site.
 - the PRA presented was based on many assumptions that EPA may or may not agree with.
 - the assumptions are poorly documented that EPA cannot attempt to duplicate the results.
 - without an agreeable work plan EPA cannot verify the results.
- B. **Ecological PRA**
 - it is difficult to ignore the possible ecological damage when PCBs have been found in the Kalamazoo River sediments, yet the PRP did not conduct a ecological risk assessment (i.e., the PRA report did not mention ecological concerns or any assessment).
- C. **PCB Toxicity**
 - the PCB toxicity value comes from the IRIS database at EPA. This reviewer is uncertain that the Agency can agree that the PCB dose found is not causing cancer as asserted in Section 4 in the PRA report.
 - the MDEQ report assumes that the fraction of PCB absorption in the human body is unity but the PRA report disagrees and instead uses an absorption fraction of 0.76
 - the PRA assumes that various cooking methods would destroy some of the PCBs in fish
 - the PCB dose is based on these and other assumptions that EPA may not agree with

- D. Former Impoundments PCB concentration
- the mean exposure-point soil concentration is calculated based on many assumptions that EPA may not agree with
 - e.g., the soil data is treated as if they came from three different, distinct areas but are they really distinct areas?
 - e.g., the PRA assumes (without documentation) that the upper 95th percent confidence limit on the mean concentration of PCBs is either a normal distribution or a lognormal distribution.
- E. Hunter/Fisher Dermal Contact Scenario
- EPA should agree first that the scenario corresponds to a hunter/fisher staying on the former impoundment for a day's activity, 20 times per year for a hunter and 10 days for a fisher.
 - the PRA assumes that every other day the hunter/fisher gets his/her hands muddy through activities. These assumptions were not documented.
 - the PRA assumes that the average years of eating fish was 10 to 12 years, and the average time spent fishing was 25 years.
- F. Fish Ingestion
- the PRA does not justify using a certain model for estimating the effective lifetime average intake of PCBs.
 - other models are used for this major exposure pathway but the report does not provide reasons or justification for using the models.
- G. Computer Software
- the contractor used models that are not justified, and wrote their own computer codes to run the Monte Carlo simulation that EPA cannot easily duplicate the results.



7





JOHN ENGLER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



RUSSELL J. HARDING
DIRECTOR

July 5, 2002

Ms. Shari Kolak
Remedial Project Manager
United States Environmental Protection Agency
77 West Jackson Boulevard SR-6J
Chicago, Illinois 60604-3590

EXHIBIT	
7034	
DEPONENT NAME:	DATE:
Paul Montney	8/16/14

Dear Ms Kolak:

The Michigan Department of Environmental Quality (MDEQ) has completed its review of the draft *Remedial Investigation/Feasibility Study (RI/FS), Supplement to the Kalamazoo River, and Former Impoundment Approaches* documents, submitted by the Kalamazoo River Study Group (KRSG).

Under the Administrative Order by Consent (AOC) between the parties of the KRSG and the State of Michigan, the draft RI/FS is considered "disapproved" under paragraph 30(d) of the AOC. As the United States Environmental Protection Agency (U.S. EPA) now has the enforcement lead for the river RI/FS, the MDEQ will defer department modification of the RI/FS (also under paragraph 30(d)) to the U.S. EPA. Detailed comments from several reviewers are included in this comment package. All comments in this correspondence should be considered in revising the RI/FS. Additional comments, e-mailed April 5, 2001 to the MDEQ and the U.S. EPA from the National Oceanographic Atmospheric Administration are incorporated by reference. We also recommend utilizing the comments of previous U.S. EPA project managers, such as those transmitted to the MDEQ September 5, 2001. We have attached copies of those comments for easy reference.

In the creation and submittal of this draft RI/FS, the KRSG has demonstrated an inability or unwillingness to report facts objectively. The MDEQ does not consider the draft RI/FS a good faith effort to develop reasonable remedial options or impartially evaluate alternatives consistent with the AOC or the National Contingency Plan (NCP). The MDEQ believes the KRSG's preferred alternative, as a stand-alone remedy, does not satisfy the two threshold evaluation criteria under the NCP. Given the MDEQ's experience with the series of inadequate documents consistently produced by the KRSG's consultant (i.e. technical memoranda, RI/FS documents for other operable units) we recommend

July 5, 2002

that the U.S. EPA take over the revision and completion of all RI/FS documents for the river operable units. Additionally, as RI/FS negotiations begin, we suggest that the U.S. EPA recommend that the potentially responsible party group obtain a new consultant.

The comments in this letter may refer to concepts or statements that appear in several places in the draft RI/FS documents. This letter does not attempt to list each instance in which a particular concept or statement needs to be changed; revisions should be made to the document globally. The comments in this letter do not imply agreement with any portion of the draft RI/FS not specifically mentioned in this comment package.

Overall, the document seems to have been written by attorneys, not scientists. Much of the RI/FS reads as an argumentative advocacy piece intended to persuade the reader that the MDNR is partially to blame for the polychlorinated biphenyl contamination in the river. Many of the KRSG's statements in the RI/FS are absolutely incorrect or based on false assumptions. The draft RI/FS should be revised so that it excludes the blaming and finger-pointing and includes factually relevant information regarding nature and extent of contamination, the clear threats to public health and the environment, and an unbiased evaluation of appropriate alternatives for remedial action.

We look forward to assisting in revising the RI/FS in any way you deem appropriate.

Sincerely,

A handwritten signature in cursive script, appearing to read "Brian von Gunten for BIG".

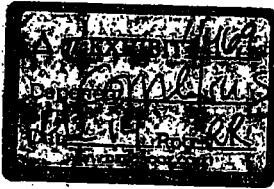
Brian von Gunten
Project Manager
Environmental Response Division
517-373-6808

Attachment

cc: Mr. Mark Brown, Respondent's Representative (KRSG)
Kalamazoo River Site File

[REDACTED]





DRAFT FOR STATE AND FEDERAL REVIEW

***Allied Paper, Inc./Portage
Creek/Kalamazoo River
Superfund Site RI/FS***

***Supplement to the Kalamazoo
River RI/FS - Phase I***

Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site
Kalamazoo and Allegan Counties,
Michigan

October 2000

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Disclaimer

"Disclaimer: This document is a DRAFT document prepared by the Respondents pursuant to a government Administrative Order. This document has not received final acceptance from the Michigan Department of Environmental Quality. The opinions, findings, and conclusions expressed (unless otherwise noted) are those of the authors and not those of the Michigan Department of Environmental Quality." Those expressed opinions, findings, and conclusions regarding the transport, fate, and effects of PCBs in the Kalamazoo River presented by this document have been significantly limited by the Michigan Department of Environmental Quality's prohibition on the use of the results of certain studies and data, and the application of computer models to assess the transport and fate of PCB in the Kalamazoo River. Those results and the author's more complete opinions, findings, and conclusions regarding the transport, fate, and effects of PCB in the Kalamazoo River are presented in the accompanying document titled *Supplement to the Kalamazoo RI/FS*.

Note: After review and final acceptance of this document, the Disclaimer will read as follows:

Disclaimer

"Disclaimer: This document was prepared by the respondents pursuant to a government Administrative Order. This document has received final acceptance from the Michigan Department of Environmental Quality. The opinions, findings, and conclusions expressed, unless otherwise noted, are those of the author and not those of the Michigan Department of Environmental Quality."

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Acronyms and Abbreviations

ABSA	Aquatic Biota Sampling Area
ACES	Automated Coastal Engineering System
AOC	Administrative Order by Consent
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
BAF	bioaccumulation factor
BBEPC	Blasland & Bouck Engineers, P.C.
BBL	Blasland, Bouck & Lee, Inc.
⁷ Be	Beryllium-7
BSP	Biota Sampling Plan
Cambridge	Cambridge Environmental, Inc.
CDM	Camp Dresser & McKee, Inc.
cfs	cubic feet per second
¹³⁷ Cs	Cesium 137
cy	cubic yards
DO	dissolved oxygen
DOC	dissolved organic carbon
ERA	Ecological Risk Assessment
FS	Feasibility Study
FSP	Field Sampling Plan
GPS	Global Positioning System
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HQ	hazard quotient
KALSIM	Kalamazoo River PCB Simulation Model
kg	kilogram
kg/yr	kilograms per year
KRSG	Kalamazoo River Study Group
LMMBS	Lake Michigan Mass Balance Study
LTi	LimnoTech, Inc.
MDCH	Michigan Department of Community Health
MDL	method detection limit
MDNR	Michigan Department of Natural Resources
MDEQ	Michigan Department of Environmental Quality
mg/day	milligrams per day
mg/kg	milligram per kilogram
mg/L	milligram per liter
MSU	Michigan State University
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAEL	no-observable adverse effects level
NPL	National Priorities List
OU	operable unit
²¹⁰ Pb	Lead-210
PCB	polychlorinated biphenyl(s)
pCi/g	picocuries per gram
POC	particulate organic carbon
PRA	probabilistic risk approach
QAPP	Quality Assurance Project Plan

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QA/QC	quality assurance/quality control
RI	Remedial Investigation
RRO	remedial response objective
Site	Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
SOW	Statement of Work
Supplement	Supplement to the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Report
TOC	total organic carbon
TRV	toxicity reference value
TSS	total suspended solids
UCL	upper confidence limit
UCSB	University of California at Santa Barbara
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WASP	Water Quality Analysis Simulation Program
• g/kg	microgram per kilogram
• g/L	microgram per liter

Executive Summary

Remedial Investigation / Feasibility Study and Supplement Reports

Allied Paper, Inc. / Portage Creek / Kalamazoo River
Superfund Site

Kalamazoo and Allegan Counties, Michigan

October 2000

This Executive Summary presents an overview of the data, analyses, and other information compiled within the remedial investigation and feasibility study (RI/FS) reports for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site located in Kalamazoo and Allegan counties, Michigan. Also presented are findings from extensive additional analyses of the most up-to-date data available from the Kalamazoo River (collected in 1999 and 2000), which, at the request of the Michigan Department of Environmental Quality (MDEQ), are presented separately in the report titled Supplement to the Kalamazoo River RI/FS.

With oversight by the MDEQ, the Kalamazoo River Study Group (KRSF) has conducted the RI/FS to accomplish several objectives as directed by the 1991 Administrative Order by Consent (AOC), including:

- Identify sources of PCBs to the site (polychlorinated biphenyls • the chemicals of concern at this site).
- Characterize the nature and extent of PCBs and other chemicals at the site.
- Identify PCB transport and exposure pathways to enable quantification of PCB fate and potential risks.
- Collect data sufficient to complete risk assessments and develop remedial alternatives to be evaluated in a feasibility study.
- Provide opportunities for local residents and other stakeholders to review site information.

Background and Scope

See Page 2 and RI Sections 1 and 2
See Supplement Sections 1 and 2

Data and Analyses

See Page 2 and RI Sections 3-6
See Supplement Section 3

Risk Evaluation

See Page 4 and RI Section 6
See Supplement Section 3

Remedial Objectives

See Page 5, RI Sec. 7, FS Sec. 2
See Supplement Sections 3 and 4

Remedial Alternatives

See Page 6 and FS Sections 3 to 6
See Supplement Section 4

Additional Analyses and Update to the RI/FS

See Supplement to the RI/FS

Site Background

For more than half of the 20th century, PCBs were legally used by many industries for manufacture of electrical components and other products that benefited from their fire retardant and other chemical properties. Between the late 1950s and early 1970s, used office paper sold for recycling often contained carbonless copy paper (also referred to as NCR paper). This carbonless copy paper incorporated an ink and PCB mixture. Through the process of recycling used office paper into new paper products, PCBs were released to the site through the mills' waste streams. After 1971, PCBs were removed from the manufacture of carbonless copy paper. By 1977, the potential adverse environmental and health effects of PCBs were better understood and the government banned most uses of PCBs.

The same chemical properties that made PCBs useful to industry are now responsible for persistent levels of PCBs remaining in the environment, including the Kalamazoo River. PCBs persist in the environment because they adhere readily to organic material in sediments and soils, and tend to bioaccumulate in the fatty tissue of fish and other animals.

Due to PCBs in the Kalamazoo River, extensive environmental studies of surface water, sediment, floodplain soils, groundwater, air, biota, and several active and inactive industrial facilities have been underway since the Allied Paper, Inc./Portage

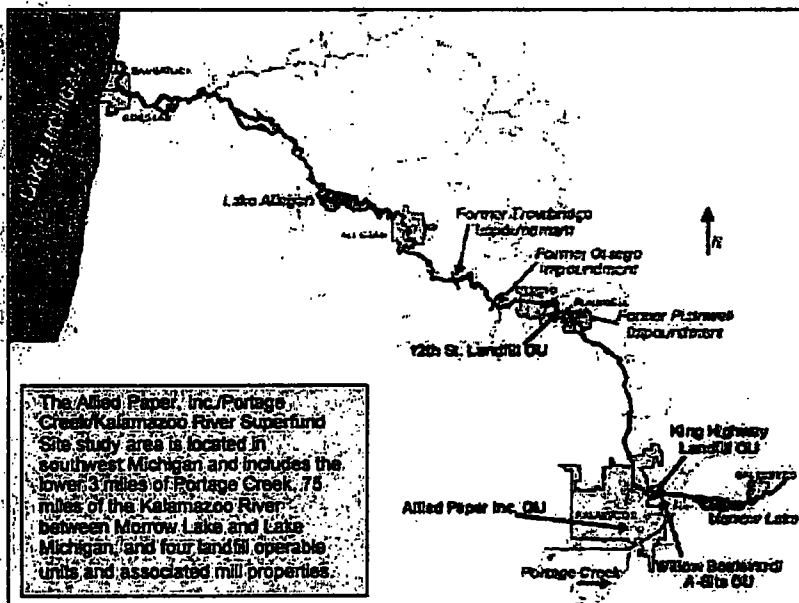
Creek/Kalamazoo River Superfund Site was added to the National Priorities List (NPL) in 1990.

Under the 1991 AOC, the companies that make up the KRSR agreed to conduct the RI/FS for the Kalamazoo River, which began in 1993 after the Michigan Department of Natural Resources (MDNR) approved comprehensive work plans for the studies. Today, the KRSR includes Millenium Holdings, Inc., Georgia-Pacific Corporation, Fort James Corporation, and Plainwell, Inc., all of which own or once owned paper recycling mills along the Kalamazoo River or Portage Creek.

The total geographic scope of the RI/FS stretches across 90 miles of river from Battle Creek to Saugatuck, and includes several investigations conducted between 1993 and 2000. These Phase I

RI/FS reports focus on the river upstream of Lake Allegan Dam; separate Phase II RI/FS reports will be issued for the lower river between Lake Allegan and Lake Michigan.

RI/FS activities are being managed by MDEQ under the federal Superfund program of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). As the lead agency on this site, the MDEQ is working cooperatively with the U.S. Environmental Protection Agency (USEPA) and other government agencies, as needed.



Remedial Investigation Summary

Extensive investigations of Kalamazoo River and Portage Creek sediments, surface water, floodplain soils, fish, and other biota are now complete or nearing completion. Starting in 1993, several distinct but related investigations began, including:

- Source Investigation
- Mills Investigation
- Floodplain Soil Investigation
- Sediment Investigation
- Surface Water Investigation
- Biota Investigation

These studies have yielded over 1 million data points, measurements, and observations that are now available for scientific and engineering evaluation, risk assessment, and risk management decision making.

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OU or Mill Property	Remedial Action	Status of RI/FS Activities
Allied OU/Bryant Mill Pond	Capped 18-acre landfill and stabilized bents. Excavated 150,000 cy from Bryant Mill Pond. RI/FS and OU closure.	Complete Complete Ongoing
King Highway Landfill OU	Capped 23-acre site and stabilized bents.	Complete
Willow Boulevard/A-Site OU	Excavated 7,000 cy and stabilized A-Site bents. RI/FS and OU closure.	Complete Ongoing
12th Street Landfill OU	RI/FS and OU closure.	Ongoing
Former Allied Paper/Bryant Mill	Sampling indicated no action necessary.	Complete
Former Allied Paper/King Mill	Excavated 11,000 cy to date; further work needed.	Ongoing
Former Allied Paper/Monarch Mill	Sampling indicated no action necessary.	Complete
George-Facile/Kalamazoo Mill	Excavated 33,000 cy and restored area.	Complete
(Simpson) Plainwell Mill	Cleaned storm sewers.	Complete
King Street Storm Sewer Area	Excavated 6,000 cy and restored area.	Complete

While the Kalamazoo River RI/FS has been underway, significant voluntary remedial actions and additional RI/FS efforts have been moving forward at the four landfill operable units (OUs) and other locations of the site, as summarized in the table above. The OUs are being managed separately to allow work to progress concurrently with the much larger river investigations. The four OUs are the Allied Paper, Inc. OU on Portage Creek, King Highway Landfill OU and Willow Boulevard/A-Site OU both in Kalamazoo, and the 12th Street Landfill OU in Plainwell.

To date, over 5,000 samples of sediment, soil, water, and biota have been collected from the Kalamazoo River and analyzed for PCBs and other chemicals. The bulk of the data presented in the RI/FS reports are from 1993 and 1994, when the first large-scale sampling occurred on the river. However, investigations continue today with additional data being collected throughout the river to further refine evaluations of PCB sources, distribution, potential transport (movement), and risks.

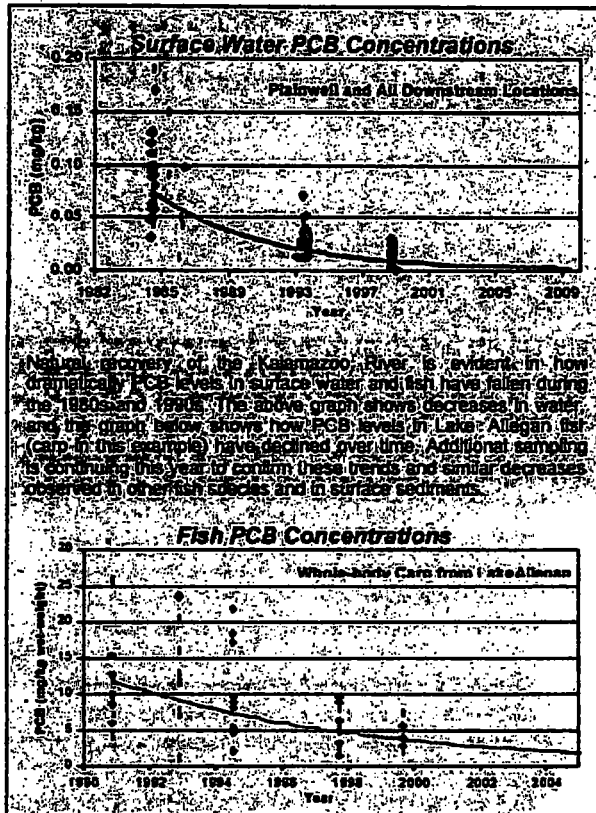
The Supplement to the Kalamazoo River RI/FS presents the most up-to-date findings of these additional studies, focusing particularly on how conditions have continued to improve during the 1990s. The Supplement also describes how new tools are under development to help MDEQ and others determine the best course of action for improving the Kalamazoo and further reducing risks. For example, scientists are developing a sophisticated computer-based mathematical model of the Kalamazoo River to better understand the movements and fate of sediment and PCBs in the river. This new tool, and the new data used to develop it, is fully discussed in the Supplement report, including how it has been used to evaluate current conditions in the river and how potential future remedial actions would improve those conditions.

The three primary conclusions that can be drawn from the remedial investigation are:

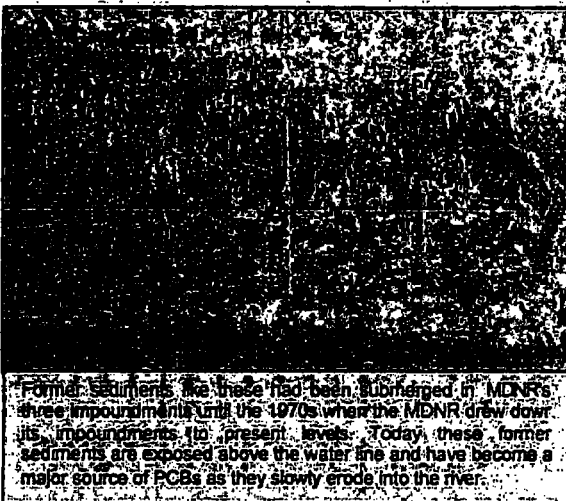
- *PCB concentrations in fish, surface water, and surface sediment have decreased significantly over the past 20 years as a result of natural recovery processes in the Kalamazoo River.*
- *Continuing uncontrolled sources of PCBs are depressing the rate of natural recovery and playing an increasing role in potential risks.*
- *PCB concentrations in submerged sediment are low and relatively evenly distributed throughout the site. There are no apparent "hot-spots" where a large mass of PCBs is concentrated within a small volume of sediment.*

As shown in the figure on the next page, multiple lines of evidence support the conclusion that PCB concentrations have decreased markedly over the past two decades due to natural recovery processes. Natural recovery (technically called "natural attenuation") occurs when the physical, chemical, or biological processes in nature degrade or isolate contaminants over time. Because the Kalamazoo River is dominated by several dams and impoundments, the physical process of PCB and sediment burial removes PCBs from the uppermost surface layer of the sediment bed (in impounded areas) where they would otherwise be available for uptake by fish and other organisms.

RI and the latest supplemental data confirm that natural recovery is active in the Kalamazoo River and is responsible for the observed decrease of PCB levels in fish and surface water. The figure below shows these declines, which have already decreased exposure and potential risks, and are expected to continue into the future.



In contrast to the positive gains from natural recovery, the RI identified several uncontrolled sources of PCBs that continue to impact the system today. The most significant of these is the erosion of PCB-containing material from what used to be submerged sediments in the three MDNR-owned former Plainwell, Otsego, and Trowbridge impoundments (see photo below).



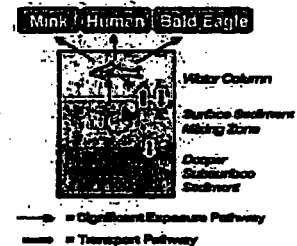
When MDNR drained the impoundments in the 1970s, these former sediments were left above today's water line and now contribute up to 100 kg of PCBs to the river each year. If this source of PCBs were controlled, the rate and effectiveness of natural recovery would increase and risks would further decrease.

The thousands of sediment data points collected from the river show that PCB concentrations in channel sediments are low. In fact, 76% of surface sediment samples had PCB concentrations below 1.0 mg/kg, and 97% were less than 10 mg/kg. Further, there are no PCB "hot spots" in these sediments that would need to be remediated to reduce localized exposure.

Evaluation of Potential Risks

The Michigan Department of Community Health (MDCH) and the Agency for Toxic Substances and Disease Registry (part of the U.S. Department of Health and Human Services) agree that recreational activities such as boating, swimming, and wading in the Kalamazoo River are safe. This is because water and sediment PCB concentrations are low and the potential amount of PCB that could be absorbed through the skin is small. Based on risk assessments conducted for the river, consumption of fish is the only significant PCB exposure pathway for both humans and ecological receptors like bald eagles and mink.

"Bioavailable" PCBs are those located in the water column or surface sediment. From there, PCBs can accumulate in fish and be passed to people or wildlife if those fish are eaten. Or natural attenuation processes ongoing in places like Lake Allegan (right) can bury PCBs in the sediment bed where they become unavailable for exposure or transport.



While MDEQ's initial screening-level ecological risk assessment found that certain song birds and small mammals might have been at risk from exposure through the terrestrial (land-based) food web, more in-depth studies by Michigan State University scientists using up-to-date plant data from the site show that these animals are not at risk from PCBs. This is further explained in the Supplement to the RI/FS.

As shown in the figure above, fish play a central role at this site because they concentrate PCBs. These PCBs are then passed up the aquatic (water-based) food chain and may pose risks if receptors such as people, mink, or bald eagles eat too many fish or eat them too often.

PCBs in surface sediments or the water column will wind up either buried in deep sediment where they are not available for exposure, or will find their way into fish and eventually into the people and animals who eat those fish.

Overall, the risk evaluations conducted thus far on the Kalamazoo River show that reducing PCB levels in fish is the key to reducing potential risks to anglers and fish-eating wildlife. Thus, the goal of any additional remedial action at the site must be to reduce PCB levels in fish in a way that does not increase risks or reverse the significant benefits already gained through more than 20 years of natural recovery.

Remedial Response Objectives

Remedial response objectives (RROs) are the specific goals that a remedial plan must meet to be considered successful in reducing risks. RROs are the starting point for developing and evaluating remedial options in the feasibility study, leading eventually to selection and implementation of a remedial plan for the site.

Both the RI report and Supplement to the RI/FS show conclusively that the natural processes at work in the river are responsible for the observed decreases of PCB concentrations in fish, the water column, and surface sediments. However, the RI identified sources that continue to put PCBs into the river today. The predominant source is erosion of the riverbanks within MDNR's three former impoundments. Controlling these sources would have the double benefit of reducing the amount of PCBs in river water carried downstream to be deposited in Lake Allegan or Lake Michigan, and speeding up the rate of natural recovery. Both improvements would further reduce PCB levels in fish.

Given these considerations, the primary goal (or RRO) for any remedial plan for the Kalamazoo River is to:

- *Reduce PCB concentrations in Kalamazoo River fish tissue to acceptable levels in terms of human health and ecological risk.*

Related goals that would improve the overall quality of the river and continue to help reduce potential risks associated with eating Kalamazoo River fish are:

- *Reduce water-column transport of dissolved or particle-bound PCB to Lake Michigan.*
- *Reduce PCB loading to the Kalamazoo River.*

Feasibility Study Summary

To accomplish the remedial objectives and protect human health and the environment, specific remedial technologies and strategies have been developed and evaluated in the site's feasibility study. This detailed engineering study describes several remedial options and evaluates them against key decision making criteria required by CERCLA and NCP regulations.

For the Kalamazoo River, the potential remedial approaches available fall into 12 categories (called general response actions, see box below) for managing site risks, ranging from no further action to technologies such as sediment capping or removal. Within these categories, a total of 66 specific options were evaluated in the feasibility study in terms of their effectiveness, implementability, and relative cost.

General Response Actions Considered in the Kalamazoo River Feasibility Study

No Further Action - No additional action would be taken.

Source Control - Continuing sources of PCBs would be identified and eliminated or reduced.

Institutional Controls and Monitoring - Fish consumption advisories, dam maintenance, and other administrative measures would be used to reduce PCB exposure. Long-term monitoring tracks changes in site conditions over time.

Monitored Natural Attenuation - Natural processes reduce PCB exposure over time, which would be verified periodically through an extensive long-term monitoring program.

In-place Containment - Natural or engineered barriers stabilize and isolate PCBs in place. Sediment capping and stabilization of eroding riverbanks are two examples.

Hydraulic Modification - The river channel itself would be modified or moved to reduce PCB exposure and transport.

Sediment Treatment - Sediments would be treated in place or after removal to reduce toxicity and volume.

Sediment Removal - Sediments would be removed via hydraulic dredges or mechanical excavation.

Sediment Dewatering - Sediments removed from the river would contain large amounts of water that would need to be removed prior to sediment disposal.

Sediment Disposal - Once removed, sediments would be transported off-site to existing landfills or put into on-site confined disposal facilities (CDFs) built near the river.

Residuals Management - Treatment or other wastes would have to be properly managed to prevent exposure.

Fisheries Management - Includes measures to remove PCB-containing fish or modify their habitat.

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From this initial screening process, the technologies and specific options considered most feasible were assembled into remedial alternatives for detailed evaluation and cost estimating. Thus, five remedial alternatives, listed in the box below, were developed for the Kalamazoo River and fully evaluated within the feasibility study and Supplement to the RI/FS.

Remedial Alternatives Evaluated in the Kalamazoo River Feasibility Study
<p align="center">Alternative 1</p> <ul style="list-style-type: none"> • No further action • No cost
<p align="center">Alternative 2</p> <ul style="list-style-type: none"> • Institutional controls (e.g., fish consumption advisories) • Long-term monitoring • \$1,186,000 total cost
<p align="center">Alternative 3</p> <ul style="list-style-type: none"> • Source control through stabilization of riverbanks in former Plainwell, Oshtemo, and Trowbridge impoundments (would stop major source of PCB transport to river) • Monitored natural attenuation (long-term monitoring of natural recovery, maintenance of bank stabilization) • Institutional controls (e.g., fish consumption advisories) • 5 years to implement • \$73,186,000 total cost
<p align="center">Alternative 4</p> <ul style="list-style-type: none"> • River-wide capping of all submerged sediments (placement of cap barrier over all 2,895 acres of river) • Source control through stabilization of riverbanks in former Plainwell, Oshtemo, and Trowbridge impoundments • Institutional controls (e.g., fish consumption advisories) • Long-term monitoring and maintenance • 40 years to implement • \$1,734,382,000 total cost
<p align="center">Alternative 5</p> <ul style="list-style-type: none"> • River-wide dredging of all submerged sediments (removal of over 16,000,000 cubic yards of sediment) • Disposal in on-site confined disposal facilities to be built • Source control through stabilization of riverbanks in former Plainwell, Oshtemo, and Trowbridge impoundments • Institutional controls (e.g., fish consumption advisories) • Long-term monitoring and maintenance • 25 years to implement • \$2,618,445,000 total cost

To identify the preferred remedial plan, the five alternatives were evaluated, individually and comparatively, against nine criteria required by CERCLA and the NCP. The criteria and the key question each alternative must address are:

- **Overall Protection of Human Health and the Environment** – Does the alternative reduce risks and maintain protectiveness over time? Are all remedial response objectives met?
- **Compliance with Applicable or Relevant and Appropriate Requirements** – Does the alternative comply with all ARARs, or are waivers necessary?
- **Long-Term Effectiveness and Permanence** – Does the alternative maintain protection of human health and the environment after response objectives have been met?
- **Reduction of Toxicity, Mobility, or Volume through Treatment** – Does the alternative use treatment to reduce the mobility, toxicity, or volume of PCBs?
- **Short-Term Effectiveness** – How does construction of the alternative affect human health and the environment?
- **Implementability** – Is the alternative technically and administratively feasible? Are trained workers and necessary equipment and materials readily available? How long will the project take?
- **Cost** – How much will it cost to implement and maintain the alternative and monitor its effectiveness?
- **Agency Acceptance** – Is the alternative acceptable to state and federal agencies?
- **Community Acceptance** – What concerns do local residents and other stakeholders have?

The chart on the next page summarizes the findings of the detailed evaluation of remedial alternatives presented in the feasibility study. The resulting preferred alternative is summarized on page 8.

Note that the last two criteria (Agency and community acceptance) are not evaluated at this time. Rather, they are considered after receiving public comment on the formal Proposed Plan during the associated public comment period. MDEQ then addresses public concerns in the Responsiveness Summary section of the Record of Decision (ROD) document.

Additional site-specific information and evaluations of the remedial alternatives are presented in the Supplement to the RI/FS.

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Kalamazoo River Remedial Alternative Evaluation Matrix

NCPRI CRITERIA	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
Overall Protection of Human Health and the Environment	Reduces risk through natural attenuation. Limited achievement of RPOs. Overall protection limited by continuing PCB inputs that will slow rate and effectiveness of natural recovery.	Reduces risk through natural attenuation. Limited achievement of RPOs. Protection enhanced by fish consumption advisories and monitoring natural recovery.	Reduces risk through source control by stopping erosion of former sediments from riverbanks of MDNR's three former impoundments. All RPOs achieved.	Reduces risk by minimizing PCB loads from eroding bank sediments and isolating capping PCB in place. Natural recovery disrupted during the 40-year project. No additional risk reduction over Alternative 3. All RPOs achieved, but on a protracted time frame.	Preventing targeted removal of PCB mass but cleanup goals are unlikely to be obtained. Natural recovery disrupted during the 25-year project. No additional risk reduction over Alternative 3. All RPOs achieved, but on a protracted time frame.
Compliance With ARARs	PCB water quality standards would need to be waived.	PCB water quality standards would need to be waived.	PCB water quality standards would need to be waived.	PCB water quality standards would need to be waived.	PCB water quality standards would need to be waived.
Long-term Effectiveness	Natural recovery would continue to reduce risks to both humans and wildlife. Effectiveness not monitored.	Natural recovery would continue to reduce risks to both humans and wildlife. Effectiveness ensured through maintenance of impoundments and dam. Long-term monitoring will track effectiveness.	Would decrease PCB in fish, water, and surface sediments over long-term. Proper design, implementation, and enhanced monitoring program would ensure long-term reliability.	Potentially reliable & effective. Construction would take 40 years, delaying benefits. Impact to benthic community may be irreversible. Flood flows could be altered and flood capacity decreased. Shrub incursions possible.	Potentially reliable & effective. Assumption that PCB cleanup goals would be met is likely optimistic. Benthic community and habitat completely destroyed. Future impacts uncertain and recovery potential unknown.
Reduction of Toxicity, Mobility, or Volume through Treatment	No reductions through treatment.	No reductions through treatment.	No reductions through treatment.	No reductions through treatment.	Treatment is not significant. Low PCB concentrations, high material volumes, and technology limitations make treatment impractical.
Short-term Effectiveness	No short-term adverse impacts. Removal of fish consumption advisories could increase short-term risk.	Short-term effectiveness high since natural recovery is not disrupted and monitoring and institutional controls are implemented quickly.	Short-term impacts include localized disruption of habitats in former impoundments; localized disruption of recreational activities; moderate increase in local truck traffic.	All potential impacts for Alternative 3 apply. River-wide disruption or destruction of wildlife habitat. Significant increase in site-wide truck traffic. Worker safety risks created due to 40-year time frame and construction complexity.	All potential impacts for Alternative 3 apply. River-wide destruction of benthos and wildlife habitat. Significant increase in site-wide truck traffic. Worker safety risks created due to 25-year time frame and construction complexity.
Implementability	Technically and administratively feasible.	Technically and administratively feasible.	Technically and administratively feasible. Bank stabilization uses reliable and conventional methods and materials.	Administratively feasible. 40-year time frame. 14,500,000 cubic yards of materials necessary. 2,600,000 truck trips to move materials on and off site.	Achievable; cleanup goals may be significantly exceeded. Storing on-site disposal Corp administratively difficult. 25-year time frame. 29,000,000 cubic yards of materials necessary and 4,800,000 truck trips.
Estimated Costs (NPV - Net Present Value)	No capital or O&M costs.	Capital = \$0 O&M = \$1,186,000 Total = \$1,186,000 (\$543,000 NPV)	Capital = \$43,340,000 O&M = \$29,848,000 Total = \$73,188,000 (\$40,678,000 NPV)	Capital = \$981,880,000 O&M = \$772,402,000 Total = \$1,754,282,000 (\$300,484,000 NPV)	Capital = \$2,582,230,000 O&M = \$698,228,000 Total = \$3,280,458,000 (\$558,747,000 NPV)

Proposed Remedial Plan

After a thorough assessment, which included consideration of the findings of the RI and risk evaluations as well as a comparative evaluation against NCP criteria, the most timely, reliable, cost-effective, and protective remedial alternative was determined to be Alternative 3 (stabilization of eroding banks in the former impoundments, monitored natural attenuation, and institutional controls). On balance, Alternative 3 is expected to deliver the greatest overall level of risk reduction in fish, surface water, and surface sediment while minimizing habitat impacts and construction-related risks during implementation.

Alternative 3 is expected to reduce risks primarily through source control and natural recovery, a viable approach recognized by the USEPA in its national Contaminated Sediment Management Strategy. Specifically, the eroding riverbanks in the former impoundments would be stabilized to control that source of PCBs, an extensive monitoring program would track the continued effectiveness of natural attenuation, maintenance of institutional controls such as fish consumption advisories would continue, and other uncontrolled PCB sources would be investigated for possible further response action by MDEQ.

This plan will be effective not only because of its ability to reduce risks. It also avoids most of the negative impacts inherent in the more intrusive alternatives (Alternatives 4 and 5), such as protracted time frames, highly complex construction projects, potentially serious worker safety risks, and widespread destruction of habitats both in the river and along its banks.

Further, the proposed remedial plan is designed to complement the benefits already achieved through remediation of the KRSO mill properties and OUs and work in conjunction with the ongoing natural recovery processes already responsible for significant improvements in river conditions over the past two decades. In fact, based on modeling and analyses

presented in the RI/FS reports and the Supplement report, Alternative 3 is expected to speed up decreases in PCB levels in fish, water, and surface sediment. The comprehensive maintenance and monitoring program, and regulatory review required every 5 years at all Superfund sites, will include measurement of the remedy's actual performance against predicted performance to ensure the remedy is protective over the long term.

During implementation of the remedy, institutional controls would be maintained to continue to protect human health and reduce risks from PCB exposure. For example, fish consumption advisories (the best interim protection from the only PCB-exposure pathway for humans) would continue to be issued by MDCH, and all dams and impoundment pool elevations would be maintained by their owners to ensure that existing PCB-containing sediment deposits remain stable and immobilized behind the dams.

Extensive new data have been collected in recent years and applied to the "KALSIM" fate and transport model being developed for the Kalamazoo River. These up-to-date data and the new modeling tool have helped increase the level of confidence in the evaluation of remedial alternatives. As explained in detail in the Supplement to the RI/FS, the model has been developed using data collected from the

Kalamazoo River and its watershed, and is a good tool for evaluating the expected outcomes of remedial alternatives.

When the model was set to closely mimic actual conditions and how PCBs, sediments, and water move through the system, all five remedial alternatives were programmed into the model and resulting conditions were forecast up to 40 years into the future. As shown in the figure on the next page, the results confirmed what simpler calculations had concluded in the RI and FS reports: the eroding riverbanks of the three former impoundments are the highest priority for remediation, and large-scale remediation of river (submerged)

Primary Benefits of Alternative 3

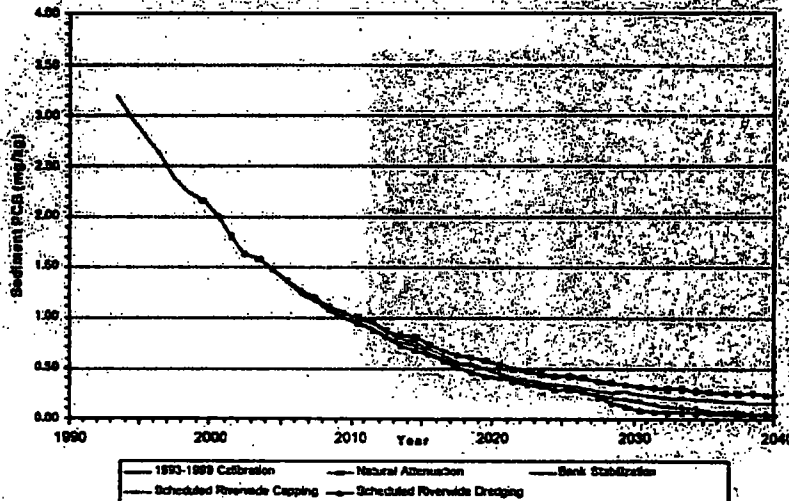
- Remedy will reduce risks and achieve all three remedial objectives:
 - reduce PCB levels in fish
 - reduce PCB transport
 - reduce PCB loading
- Source control (bank stabilization) will increase rate and effectiveness of natural recovery
- Comprehensive long-term monitoring program will track effectiveness of remedy
- Short-term risks due to construction and habitat destruction are minimized
- Design and construction will take just 6 years and use proven, reliable methods
- Over \$73 million in capital and O&M costs would be invested in risk reduction efforts and long-term monitoring of remedy performance
- Remedy performance would be monitored and carefully reevaluated by MDEQ and USEPA every five years, as required by CERCLA
- Alternative 3 delivers the greatest overall net environmental benefits to the community and Kalamazoo River watershed

DRAFT FOR STATE AND FEDERAL REVIEW

sediments would do little to improve upon the gains already achieved through more than two decades of natural recovery.

Coupled with work already accomplished and the assurances through long-term monitoring that natural recovery and the additional source controls proposed will perform as expected, the proposed remedy will significantly speed up recovery of the river and reduce potential risks posed by PCBs to anglers and local wildlife.

KALSIM Model Forecast of Lake Allegan Surface Sediment PCB Concentrations under Different Remedial Scenarios



Compared to more intrusive and complex capping or dredging remedies, Alternative 3 (bank stabilization and natural recovery) reduces PCB concentrations (and risks) over similar time frames, but with far fewer adverse impacts and for less cost. Using the KALSIM model, the above graph shows forecasted trends for Lake Allegan surface sediment PCB concentrations.

The Future...What's Next?

Once the RI/FS reports are reviewed and approved by the MDEQ, a formal "Proposed Plan" document will be prepared to summarize the preferred remedy and formally present it to the public for review and comment. A public comment period (typically 30 days) then follows to gather input on the plan from local residents and numerous other stakeholders. During the comment period, MDEQ will hold one or more public meetings to present the Proposed Plan and gather public comments first-hand.

After all comments are received, the MDEQ will prepare the Record of Decision (ROD) to explain in detail what the final remedial plan will be and

In summary, Alternative 3 is expected to deliver the greatest overall net benefits to local communities and the Kalamazoo River watershed through timely implementation of a project that will invest over \$73 million in effective risk reduction measures and long-term monitoring of remedy performance. Moreover, this proposed work is in addition to the significant remedial actions already accomplished in recent years at the four landfill operable units and other KRSG properties on the Kalamazoo River and Portage Creek.

what legal and technical requirements it must meet to be successful. When the ROD is finished and signed, engineers will begin to design and construct the remedy. Following construction, the long-term monitoring and maintenance program would ensure that the remedy performs as designed. Every 3 to 5 years, samples are collected to track the effectiveness of the remedy. In addition, MDEQ and USEPA would conduct regulatory reviews every 5 years to assess remedy performance.

For More Information:

Additional information and reports are available at these local libraries or by contacting the MDEQ project manager listed below:

Allegan Public Library
331 Hubbard St.
Allegan, Michigan
(616) 673-4825

Waldo Library
Western Michigan University
Kalamazoo, Michigan
(616) 397-5156

Kalamazoo Public Library
315 South Rose
Kalamazoo, Michigan
(616) 342-9837

Otsego District Library
219 South Farmer St.
Otsego, Michigan
(616) 694-9690

Saugatuck-Douglas District Library
10 Mixer St.
Douglas, Michigan
(616) 857-8241

Charles Ransom District Library
180 South Sherwood Ave.
Plainwell, Michigan
(616) 885-8024

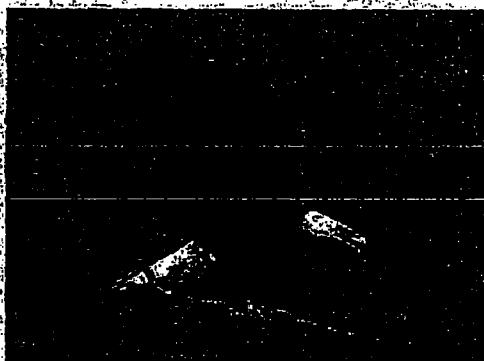
Mr. Brian von Gunten, Project Manager
MDEQ Environmental Response Division - Superfund Section
Knapps Center - Mezzanine Level
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Development of a remedial plan that will effectively protect anglers and fish-eating wildlife, like the bald eagle, is one of the primary objectives of the supplemental studies.

What is this Supplement to the Kalamazoo River RI/FS?

This document presents a series of additional studies of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site and Morrow Lake. The studies are designed to update and supplement the data gathered during the Remedial Investigation and to extend the evaluation of remedial alternatives in the Feasibility Study. Descriptions of these studies and status reports are presented in this Supplement.

Who is involved in the supplemental studies?

A team of experts from six companies and three universities - Michigan State University, the University of Buffalo, and the University of California at Santa Barbara - are involved in the design and implementation of the nine supplemental studies of sediment, surface water, and terrestrial and aquatic biota within the Site and Morrow Lake.

Why are these studies presented in a Supplement to the RI/FS?

The Michigan Department of Environmental Quality (MDEQ) has declined to either participate in the development of the studies or review the associated work plan. As a result, the MDEQ directed that all discussions of the supplemental studies be presented in a report separate from the Remedial Investigation and Feasibility Study reports.

Why include Morrow Lake?

PCB levels in Morrow Lake currently exceed Michigan water quality standards, and fish consumption advisories are in effect for carp and smallmouth bass. Since Morrow Lake is upstream of the Site, the PCB in its sediments and water are a point of concern since they are sufficient to sustain PCB levels in Site surface water in excess of state standards. Furthermore, if left uncontrolled, this source of PCB will impact the effectiveness of any remedial alternative implemented at the Site.

1. Introduction

1.1 Purpose and Objectives

This *Supplement to the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study* (Supplement) was prepared by Blasland, Bouck & Lee, Inc. (BBL) on behalf of the Kalamazoo River Study Group (KRSF). The primary purposes of the Supplement are to:

- 1) Describe important additional studies and data collection efforts conducted for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site) but not included in the Remedial Investigation (RI) Report (BBL, 2000a);
- 2) Provide information needed to advance ecological and human health risk assessments beyond screening-level or Tier I assessments;
- 3) Update the Site conceptual model presented in the RI Report (BBL, 2000a); and
- 4) Provide additional information critical to a thorough evaluation of the remedial alternatives considered in the Feasibility Study (FS) Report (BBL, 2000b), in particular to develop and apply a comprehensive fate and transport model of the Kalamazoo River.

An RI/FS was conducted for the Site pursuant to an Administrative Order by Consent (AOC) (Final Order No. DFO-ERD-91-001) issued by the Michigan Department of Natural Resources¹ (MDNR) (MDNR, 1991). The RI/FS Work Plan (Blasland & Bouck Engineers, P.C. [BBEPC], 1993d) and addenda (Brown, 1995a, 1995b, 1996; BBL, 1997)

¹ In October 1995, the environmental quality divisions were split from the MDNR and placed in the newly created Michigan Department of Environmental Quality (MDEQ).

Section Summary

As an update and extension of the Kalamazoo River RI/FS (which presents data collected primarily in 1993 and 1994), this Supplement document provides the following information:

- Results of substantial additional studies of sediment, surface water, and biota conducted in 1999 and 2000.
- Results of additional ecological and human health risk assessments as an extension of screening level assessments conducted by the MDEQ.
- Update of the overall Site conceptual model presented in the RI Report.
- Results of a comprehensive sediment and PCB fate and transport model for the Kalamazoo River developed and used as a sophisticated tool for assessing the effectiveness of the remedial alternatives evaluated in the FS Report.

were developed in accordance with the AOC Statement of Work (SOW) to present the activities and methods for completing the RI/FS. The objectives of the RI/FS are described in the RI and FS Reports (BBL, 2000a; 2000b).

Initiated in 1993, the RI included investigations of Site sediments, surface water, floodplain soils, and biota. The majority of the RI field efforts were completed by 1994. The results of the Site investigations were presented in a series of technical memoranda and addenda submitted to the MDNR/MDEQ; these results are summarized in the RI Report (BBL, 2000a). In 1999 and 2000, the KRSG convened a group of experts to review the results of investigations conducted to date, develop a scope of additional studies needed to fill data gaps and complete the RI/FS in a comprehensive manner, investigate human and ecological risks, and develop a fate and transport model to fully evaluate all the remedial alternatives. This group of experts is identified below.

**Experts Involved in the Planning or Performance of
Additional Site Studies**

Arcadis JSA

Kenneth D. Jenkins, Ph.D.

Blasland, Bouck & Lee, Inc.

Mark P. Brown, Ph.D.

Douglas K. Cowin, P.G.

Stephen D. Garbaciak, P.E.

Michael D. Scoville

Cambridge Environmental, Inc.

Laura C. Green, Ph.D., D.A.B.T.

Edmund A.C. Crouch, Ph.D., D.A.B.T.

Environ

Joyce S. Schlesinger, P.E.

Steven Washburn

Fort James Corporation

A.J. Moody

LTI-Limno-Tech, Inc.

Gregory W. Peterson

Michael Erickson

Michigan State University

John P. Giesy, Ph.D.

Paul Jones, Ph.D.

Matthew Zwiernik, Ph.D.

University of Buffalo

Joseph DePinto, Ph.D.

University of California - Santa Barbara

Wilbert Lick, Ph.D.

Joseph MacNeil, Ph.D.

The supplemental studies were specifically designed to address outstanding data needs, obtain information needed for ecological and human health risk assessments, and support the development of a comprehensive mathematical fate and transport model for sediment and polychlorinated biphenyls (PCB). Updating existing data was particularly important, given the age of most of the data.

A sampling program was developed, which included the sampling and analysis of surface water, sediment, and terrestrial and aquatic biota, as well as the gathering of other physical information. The additional studies were designed to be consistent with the procedures, methods, and requirements specified in RI/FS management plans that were approved by the MDNR/MDEQ, including:

- *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study Work Plan* (RI/FS Work Plan) (BBEPC, 1993d) and addenda (Brown, 1995a, 1995b, 1996; BBL, 1997);
- *Field Sampling Plan* (FSP; BBEPC, 1993e);
- *Quality Assurance Project Plan* (QAPP; BBEPC, 1993a);
- *Health and Safety Plan* (HASP; BBEPC, 1993b);
- *Data Management Plan* (BBEPC, 1993c); and
- *Biota Sampling Plan* (BSP; Camp Dresser & McKee [CDM], 1993).

On behalf of the KRSG, BBL presented the scope of the proposed additional studies to the MDEQ in technical meetings held on September 30 and October 28, 1999. The MDEQ declined at that time to participate in the further development of these investigations or review a work plan describing the study activities. The MDEQ stated that it had already initiated implementation of a *Long-Term Monitoring Work Plan* (CDM, 1999b) to analyze samples of fish, surface water, and sediment beginning in the summer of 1999; therefore, the KRSG would not have to conduct additional studies of environmental media other than sediment to complete the RI/FS.

The KRSG started the supplemental investigations in the fall of 1999, and sampling activities continue as of the writing of this Supplement. While not all analytical results are available for incorporation into this Supplement, as it becomes available this information will be used to supplement and update information generated during the RI.

In an August 3, 2000 letter (von Gunten, 2000), the MDEQ directed the KRSG not to include in the RI and FS Reports the results or conclusions of any data collection efforts conducted outside of the MDEQ-approved scope of work. Pursuant to agreements reached during a meeting with the MDEQ on September 15, 2000, the KRSG prepared this

Supplement to present the scope of additional investigations, provide the results of studies designed to refine human health and ecological risk assessments, review and update the site conceptual model, and further support the evaluation of remedial alternatives using a more comprehensive base of information than provided in the RI and FS Reports (BBL, 2000a; 2000b). The MDEQ has advised the KRSG that this information will be considered in the remedial decision making process.

1.2 Overview of Primary Findings

As detailed in this document and supporting data and information, the primary findings of the supplemental investigations and associated development and application of the KALSIM model include:

- Natural attenuation is active in the Kalamazoo River and is responsible for significant reductions in PCB bioavailability and associated potential risks, as evidenced by steady decreases of PCB concentrations in surface sediment, surface water, and fish over the past two decades or more. Forecasts from the KALSIM fate and transport model support this conclusion and show that natural attenuation is expected to continue to be effective in reducing PCB concentrations throughout the river for the next 40 years and beyond.
- There are no hot spots of large PCB mass in a relatively small area or volume of sediment in the Kalamazoo River. Moreover, empirical data and fate and transport modeling indicate that remedial actions such as capping or dredging targeted to small areas of the sediment bed would have little benefit in terms of overall risk reduction relative to the effectiveness of natural attenuation.
- Despite the documented ongoing reductions in PCB bioavailability due to natural attenuation, the rate and effectiveness of attenuation is diminished by continuing transport of PCB into the water column and onto surface sediments from the eroding riverbanks within the MDNR's three former impoundments. KALSIM forecasts show that mitigation of this source would have important benefits in accelerating natural attenuation and thereby further reducing PCB exposure and potential risks.
- In building upon the screening level ecological and human health risk assessments, application of site-specific data and more rigorous methodology reveal that site risks had been overestimated. This is especially true for the MDEQ's risk characterization for songbirds, small mammals, and humans potentially exposed to PCB contained in the exposed former sediments of the three former impoundments. Applying Site-specific plant data rather than

generic literature values, scientists from Michigan State University (MSU) have shown that the terrestrial exposure pathway associated with exposed sediment in the former impoundments does not pose risks to songbirds and small mammals. Similarly, scientists have applied new data and more rigorous methodology (e.g., probabilistic risk assessment rather than deterministic methods) to human health risks are overestimated in the MDEQ's Tier I-type human health risk assessment.

- The KALSIM PCB and sediment fate and transport model is a sophisticated analytical tool that explicitly and quantitatively represents the dynamics of the Kalamazoo River system that will allow decision makers to better assess the potential performance of various remedial alternatives. Thus, while still being refined through input of the most up-to-date data collected in 1999 and 2000 (with more data to be generated in 2001 as well), KALSIM has yielded several important conclusions that help strengthen, and in some cases dispel, assumptions about how the river will respond to the remedial actions considered in the FS Report (BBL, 2000b). The following conclusions, and many others, drawn from application of KALSIM are discussed in detail in this Supplement:
 - Engineered sediment remediation other than remediation of exposed sediment banks in the former impoundments is predicted to provide only marginal reductions in exposure concentrations relative to reductions predicted for natural attenuation in those reaches.
 - The occurrence of a 100-year flood will not disrupt the natural attenuation course of the river, and extreme natural events (e.g., floods, sever winds, or waves) are unlikely to disrupt attenuation of PCB exposure in Lake Allegan.
 - Even the most aggressive remedial alternatives such as river-wide sediment capping or removal will not achieve Michigan water quality criteria for PCB over the next 40 years.
 - Despite the tremendous cost and scale of river-wide capping or dredging alternatives, these approaches would not reduce risks significantly faster or more effectively than natural attenuation and source control (i.e., stabilization of the former impoundment riverbanks).

Additional findings are expected in the coming months as the supplemental investigations discussed in this report are completed, allowing additional refinement of the KALSIM model, completion of comprehensive baseline risk assessments, and numerous empirical and probabilistic analyses. While some studies will continue, it is anticipated that

MDEQ and other decision makers will have sufficient information available by Summer of 2001 for selecting an appropriate and effective remedy for the Kalamazoo River.

1.3 Report Organization

To facilitate review, this Supplement is presented in four sections. Section 1 provides an overview of the Supplement and a description of its purpose and objectives. Section 2 presents the scope and purpose of supplemental activities conducted to further characterize the Site. Section 3 discusses the applicability of results of the supplemental investigations to studies conducted to refine human health and ecological risk assessments, as well as to development of a PCB and sediment fate and transport model. Section 4 extends the evaluation of remedial alternatives developed in the FS Report (BBL, 2000b) in light of the results available to date from the supplemental studies.

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✦ Nine additional studies designed to address specific data needs and support ecological and human health risk assessments as well as the development of a PCB fate and transport model began in 1999 and are continuing. This section summarizes the scope of these studies.



Placement of erosion pins to aid in estimation of PCB loading from the banks of the former impoundments is one of the nine additional sampling programs undertaken to aid in further characterization of the Site

Supplemental Studies

Objectives

Surface Water Sampling	Further evaluate PCB movement in the water column to refine the KALSIM fate and transport model
Ecological Investigations	Gather data to support risk assessment work and aid in evaluation of ecological impacts due to remediation efforts
Sediment Resuspension Assessment	Gather Site-specific information to refine the KALSIM fate and transport model
Riverbank Erosion Investigation	Assess the current state of the eroding banks in the former impoundments to evaluate their PCB contribution to the river
Fish Sampling	Continue periodic monitoring of PCB levels in fish and evaluate trends
Sediment Characterization Sampling	Collect up-to-date data for comparison to 1994 data to evaluate trends and establish conditions in Morrow Lake
Remote Sensing Surveys	Develop a topographic map of the bottom of the river to aid in remediation decision-making
Geotechnical Sampling	Gather data on the physical properties of the sediment to aid in the assessment of how it would respond to various remedial alternatives
Lake Allegan Diver Survey	Characterize the bottom of Lake Allegan to aid in evaluation of remedial alternatives

2. Additional Site Characterization

2.1 Overview

Since the investigations described in the RI/FS Work Plan (BBEPC, 1993d) (approved by the MDNR in 1993) were completed and gaps in data identified, substantial field and analytical work has been performed to further characterize the physical and chemical conditions of the Site. The KRSG began the additional Site characterization activities in 1999 to address specific needs within the existing database, and to support ecological and human health risk assessments and PCB fate and transport modeling. At the MDEQ's direction, available data from these activities were omitted from the RI and FS reports (BBL, 2000a; 2000b) and are reported in this Supplement. Due to scheduling constraints, the majority of analytical data from the supplemental investigations will be generated subsequent to the submittal of the draft RI and FS reports (BBL, 2000a; 2000b). The scope and procedures for the additional sediment, surface water, fish, and physical characteristics studies, as well as the investigations designed to support refinement of the MDEQ's Ecological Risk Assessment (ERA), are described in the *Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Supplemental Studies Work Plan* (Supplemental Studies Work Plan), (included as Appendix S-1 to this Supplement). This section summarizes the additional characterization activities conducted at the Site.

Section Summary

This section summarizes the scope and objectives of the nine additional sampling programs and other studies completed or ongoing in support of the RI/FS risk assessments, fate and transport modeling, and selection of a remedy for the Kalamazoo River. The additional studies include:

- Fish sampling program
- Surface water sampling program
- Sediment characterization sampling program
- Ecological investigations
- Remote sensing surveys
- Sediment resuspension assessment
- Geotechnical sampling program
- Riverbank erosion investigation
- Lake Allegan diver survey

Unless otherwise noted, all sampling and analyses are being conducted in accordance with the FSP and QAPP approved for the RI/FS.

2.2 Fish Sampling Program

The 1999 fish sampling program was conducted to supplement the existing database of fish PCB concentrations to meet several objectives. The fish sampling in 1999 used the same MDNR/MDEQ-approved sampling and analysis protocols as in the

The purpose of the 1999 fish sampling program was to continue periodic monitoring of fish PCB levels, as fish are at the center of efforts to reduce potential risks on the Kalamazoo River. The updated fish database was used to:

- Assess trends in fish PCB levels over time
- Evaluate fish consumption advisories
- Provide detailed information for risk assessments

sampling performed in 1993 and 1997. The primary objectives of the supplemental fish sampling program were to:

- Assess temporal trends and spatial distributions in fish tissue PCB concentrations;
- Compare and evaluate the concentrations of PCB in fish with respect to current fish consumption advisories;
- Assess the relationship between PCB Aroclors and PCB congeners in fish; and
- Reasses potential ecological risks at the Site in terms of new data.

A secondary objective of the 1999 study was to collect data that could be used to evaluate different factors that may contribute to PCB bioaccumulation. Specifically, the 1999 sampling program included a determination of the ages of fish samples as well as the collection and identification of stomach contents for diet composition analysis. These data provide additional insight into the variability of fish PCB concentrations. The Work Plan for the 1999 fish sampling activities is described in detail in Appendix S-1.

A total of 526 fish were collected from ten locations generally corresponding to the Aquatic Biota Sampling Areas (ABSAs) defined for the Kalamazoo River in the BSP. A summary of the 1999 fish sampling program is provided in Table 2-1. PCB trends were evaluated through the collection and analysis of 77 carp samples, 87 smallmouth bass samples, and 29 yearling whole-body smallmouth bass composite samples. To evaluate the applicability of the fish consumption advisories, an additional 122 fish samples, which included panfish (i.e., pumpkinseed, bluegill, and black crappies), northern pike, walleye, and channel catfish, were collected and analyzed along with the carp and smallmouth bass samples. Fish samples collected specifically to support studies related to the assessment of ecological risk included 96 whole-body samples of carp, forage fish, panfish, salmon, smallmouth bass, and suckers. Results of the 1999 fish sampling available to date are presented in Appendix S-2.

In addition to the carp and smallmouth bass collected for trend monitoring purposes, a wider array of species was collected based upon the reported preferences of Kalamazoo River anglers (Agency for Toxic Substances and Disease Registry [ATSDR], 2000), thereby providing data to more accurately determine risks to human health. These data were submitted to the MDEQ in May 2000.

2.3 Surface Water Sampling Program

The surface water sampling program is being conducted to evaluate the characteristics and mechanisms of PCB transport in the Kalamazoo River. The surface water sampling program began in March 2000 and will continue through March 2001.

The purpose of the 2000-2001 water sampling program is to further evaluate PCB movement within the Kalamazoo River. These data also will be useful in further refining the KALSIM fate and transport model.

The program includes biweekly water column sampling to document conditions during a variety of seasonal and hydrologic conditions, as well as sampling during high-flow events, which specifically targets conditions favoring sediment erosion. In addition, timed-transect sampling, where a discrete parcel or "slug" of water is followed throughout the length of the river study area, was conducted to assess PCB concentration and transport variations in a given volume of water moving downstream. Tributary sampling also will be conducted to provide data that can be used to estimate solids loading from tributaries and develop a basin-wide solids budget. The sampling program includes analysis of particulate and dissolved phases of PCB in the water column, as well as routine measurement of physical parameters including flow, velocity, temperature, and turbidity. Specific objectives of the surface water investigation are to assess:

- Current PCB concentrations in the Kalamazoo River surface water;
- Seasonal and spatial variations in PCB concentrations in surface water;
- Annual and seasonal solids and PCB transport in surface water;
- Potential relationship between PCB concentration and river flow;
- Trends in the surface water PCB concentration over time; and
- Contribution of solids and/or PCB to the Kalamazoo River from major tributaries.

When available, data from the surface water sampling program will be used for calibration and verification procedures for the sediment and PCB fate and transport model, which will be discussed in subsequent sections of this report. The surface water sampling program includes a Method Detection Limit (MDL) study to quantify Site-specific, media-specific reporting and detection levels. All sampling and analyses are being performed in accordance with the MDNR-

approved FSP (BBEPC, 1993e) and QAPP (BBEPC, 1993a), with the exception of high-volume water sample filtration, which was not performed during the RI.

A summary of the surface water sampling program is presented in Table 2-2 and is described in the following subsection.

2.3.1 Biweekly Mainstem Sampling

Water column sampling is being performed biweekly during ice-free periods and monthly during the winter at 12 mainstem and diversionary locations along the Kalamazoo River. Additional samples are being collected at the River Street sampling location in Comstock using an automated sampler. Biweekly monitoring uses a uniform random approach to characterize PCB concentrations over a range of flows and seasonal factors. Flow-weighted, whole-water samples for PCB and/or total suspended solids (TSS) and total organic carbon (TOC) analysis are being collected from each surface water sampling location. At the time of sample collection, temperature, dissolved oxygen (DO), turbidity, and specific conductance are measured using standard instrumentation. Flow is measured at approximately half of the locations during each sampling event, and the water surface elevation is measured at all locations. Locations where flow is measured are alternated among events so that a flow measurement is obtained at every other sampling location on alternating events. This methodology will ultimately yield stage/discharge curves for each location.

2.3.2 Supplemental Mainstem Sampling

Twice during the year-long sampling program, the biweekly sampling events will include the collection of additional sample volume for analysis of PCB congeners (dissolved and particulate), particulate organic carbon (POC), dissolved organic carbon (DOC), and TSS. These data will be used to relate specific PCB congeners to Aroclor and total PCB data, as well as provide information on the relative partitioning of PCB compounds both seasonally and spatially within the river. To facilitate particulate PCB congener analysis, large volumes (greater than 5 liters) of river water will be collected and filtered to yield adequate suspended sediment sample mass for analysis.

2.3.3 Monthly Tributary Sampling

On a monthly basis, corresponding to approximately every other mainstem sample collection, eight major tributaries to the Kalamazoo River between Morrow Dam and Lake Michigan are being sampled. Tributaries are sampled near their mouths, but sufficiently upstream to avoid any influence of the Kalamazoo River. Tributary sampling will occur 12 times, which will produce a stage/flow rating curve from which flow may be predicted using water surface elevation. The TSS data, in conjunction with measured flows, will be used to determine sediment contributions on both a seasonal and annual basis from a given Kalamazoo River tributary. Together these data will allow for the development of a solids balance for the Kalamazoo River between Morrow Dam and Lake Michigan.

2.3.4 Timed-Transect Sampling

Synoptic, timed-transect sampling of the water column between Morrow Dam and Lake Allegan Dam was conducted on two occasions to obtain samples of approximately the same parcel of water as it progressed downstream. A hydraulic model was used to estimate the travel time between sampling locations and to determine times of sample collection at those locations. Samples were collected at 25 locations along the river. At each location, field parameters were measured, the depth of water recorded, and depth-integrated samples collected for total PCB, TOC, and TSS analysis. Sampling methods were identical to those used at the biweekly monitoring locations.

2.3.5 High-Flow Event Sampling

To quantify solids and PCB transport within the mainstem Kalamazoo River during high-flow events and to characterize transport behavior over the course of associated periods of rising and falling water levels, two high-flow events are being sampled on a more frequent basis than the biweekly sampling (see Table 2-2). Each of the 12 mainstem locations and two diversionary locations will be sampled daily as surface water levels rise during each event, and every two to three days as levels fall, until flows return to within approximately one foot of the normal level at each location. The relatively quick response (compared to the Kalamazoo River) of smaller tributaries to high-flow events will be accounted for by sampling a subset of three tributaries using automated samplers during the mainstem high-flow event sampling. Data generated from these tributaries will be used to extrapolate flow/solids rating curves for the remaining tributaries for which data are not available. High-flow events will be defined and monitored consistently according to the FSP protocols. Measurement, sample collection, and analytical procedures will be identical to the biweekly efforts. In

addition to PCB Aroclor analyses, one sample from each period of rising and falling water levels will be collected as a high-volume (>5 liter), filtered sample and submitted for analysis of PCB congeners, TSS, POC, and DOC. A subset of samples will be analyzed for particle size distribution.

2.4 Sediment Characterization Sampling Program

A sediment sampling program was conducted during 2000 to characterize current sediment conditions in the Kalamazoo River and to supplement sediment data obtained during the RI. The following subsections describe the scope of activities performed for the supplemental sediment characterization program.

> The purpose of the 2000 supplemental sediment sampling program was to provide up-to-date data for comparison to similar data collected in 1994 for the RI. Over 400 sediment cores were collected from Morrow Lake upstream of the Site and from within the Site, and 18 cores were collected for additional geochronological dating purposes.

2.4.1 Morrow Lake Sediment Sampling

Morrow Lake is a large (1,000-acre) impoundment of the Kalamazoo River a short distance upstream of the National Priorities List (NPL) Site; it has a larger surface area than all of the river segments from the city of Kalamazoo to the Allegan City Dam within the NPL Site combined. The lake has received PCB loading, most notably Aroclor 1254, which is not attributable to paper recycling, sufficient to exceed State water quality standards for PCB and trigger the fish consumption advisories currently in effect for the lake. Moreover, the levels of PCB in sediment in Morrow Lake appear sufficient to sustain levels of PCB in the lake and downstream in excess of the State's water quality standard for many years to come. Although PCB concentrations in fish are lower in Morrow Lake than within the NPL Site, they are still many times higher than a number of the benchmarks used by the MDEQ and other regulatory agencies to represent "safe" levels for various human and ecological receptors.

Since Morrow Lake was not sampled as part of previous RI activities, the characterization of sediment within Morrow Lake is necessary to develop a better understanding of this area as a potential PCB and sediment source to downstream reaches. Characterization of the PCB in Morrow Lake sediment will be useful in the interpretation of fish and surface water data, and in discerning differences in PCB composition in the Kalamazoo River from Morrow Lake downstream through the Site.

The objectives of sampling Morrow Lake sediment were to:

- Characterize the nature and extent of PCB in the sediment bed of Morrow Lake;
- Establish background sediment PCB concentrations upstream of the NPL Site;
- Collect data comparable to PCB data generated during 1993/1994 RI activities elsewhere in the Kalamazoo River, as well as data to correspond with fish tissue and surface water sampling data being collected as part of the supplemental investigations; and
- Relate PCB congener distribution to total PCB concentration and Aroclor quantitation.

Four equidistant transects were established in Morrow Lake (approximately 3,500 feet apart) between the dam and the 35th Street bridge. Four sediment cores were collected in July and September 2000 from each transect at approximately 20%, 40%, 60% and 80% of the transect length. The location of each core was surveyed using conventional survey methods or Global Positioning System (GPS) technology. The water depth, sediment depth, and thickness of sediment recovered at each core location were also recorded.

2.4.2 Morrow Dam to Lake Allegan Dam Sediment Sampling

During the summer and fall of 2000, the KRSR collected additional sediment characterization cores from the Kalamazoo River between Morrow Dam and Lake Allegan Dam. Approximately 400 cores were collected (resulting in approximately 1,800 samples) from these reaches of the river to evaluate current conditions and assess changes since 1993. Specific objectives of the sediment characterization sampling program were to:

- Provide an up-to-date assessment of PCB distribution in the Kalamazoo River sediment which can be used to evaluate changes over time by comparison with PCB data from the cores collected in 1993 and 1994;
- Confirm the distribution of fine and coarse sediments observed in the 1993/94 sediment cores;
- Provide PCB data that are comparable to, and correspond in time with, PCB data collected from the sediment in Morrow Lake;

- Provide PCB and other data that can support detailed sediment and PCB transport modeling analyses;
- Characterize sediment PCB concentrations that correspond to the results of the supplemental fish and surface water sampling efforts described previously; and
- Delineate the PCB distribution in and transport characteristics of cohesive and non-cohesive sediment, and the spatial extent and distribution of both.

In addition to providing post-1993 sediment data, these samples will provide additional information to aid in PCB fate and transport modeling efforts. The analytical data from the sediment sampling program are not yet available, but will be reported upon receipt of the results. A summary of the Morrow Dam to Lake Allegan Dam sediment sampling program is presented in Table 2-3.

2.4.3 Geochronological Sediment Sampling

Two sediment cores were collected for geochronological dating from each of the eight former and existing impoundments, with the exception of Lake Allegan where four cores were collected, to complement the existing data from the Allegan City Impoundment and Kalamazoo Lake. Specific objectives of geochronological sediment sampling were to:

- Determine rates of historical sediment deposition in each of the former and existing impoundments along the Kalamazoo River;
- Determine the historical transport of PCB within the Kalamazoo River;
- Determine the long-term solids and PCB burial rates within the Kalamazoo River;
- Estimate the thickness of the surficial sediment mixing zone at the various locations; and
- Evaluate the changes in congener patterns of PCB throughout each core.

Geochronological dating of sediment is achieved by finely sectioning sediment cores, analyzing the sections for radionuclides, and estimating the dates of approximate deposition by the vertical distribution of the tested radionuclides.

Samples from the top 70 centimeters (cm) of each core were submitted to the laboratory for analyses of Beryllium⁷, Cesium¹³⁷, and Lead²¹⁰. The corresponding cores for PCB analyses will be retained in frozen storage for analysis pending results of radionuclide analyses. If the radionuclide results for a given core yield acceptable profiles from which a sediment chronology can be developed, the corresponding samples from that core will be submitted for PCB Aroclors, PCB congeners, TOC, and percent moisture. The remaining sections of the analyzed cores (i.e., deeper than 70 cm) will be retained in frozen storage for possible analysis if preliminary results indicate the profile extends deeper than 70 cm. All sampling and analysis will be performed in accordance with the FSP (BBEPC, 1993e) and QAPP (BBEPC, 1993a). These data are not complete at the time of this report.

2.5 Ecological Investigations

Field investigations were conducted to support refinement of the ERA, and field reconnaissance was conducted to obtain information regarding habitats that may be impacted by the implementation of certain remedial alternatives. These activities are briefly summarized in the following subsections.

2.5.1 Field Studies In Support of Ecological Risk Assessment

In 2000, staff from the MSU Aquatic Toxicology Laboratory, Department of Zoology, and the National Food Safety and Toxicology Center, under the direction of Dr. John Giesy of MSU, initiated a three-year series of field studies designed to support necessary refinements to be conducted by Giesy Ecotoxicology, Inc. to the MDEQ's *Baseline Ecological Risk*

➤ The purpose of the 2000 ecological investigations was to conduct supplemental field studies necessary to support ongoing ERA work and to document current habitat conditions within the Site and how these conditions would be impacted under various remedial alternatives considered in the FS Report.

Assessment (CDM, 1999a) completed for the Site. The Site-specific field studies include exposure studies that entail the collection and analysis of environmental media for PCB congeners and selected pesticides, and effect studies that involve the collection of information related to the reproductive success and population sustainability of ecological receptors of interest. The work plan describing these studies is attached to the Supplemental Studies Work Plan in Appendix S-1.

The field studies are targeted toward the assessment of PCB exposure and population effects on certain sensitive species, and prey, plant, and sediment/soil matter within the foodchain of those species. The species of concern that are the focus of this effort include the bald eagle, the great horned owl, the red fox, the American robin, the short-tailed shrew, and the deer mouse. The ongoing effects studies require the collection of physical data for the species of concern, such as relative abundance, productivity, habitat suitability, home/foraging range, Site-specific prey items, gender, age, reproductive history, dietary composition, and other information. Information available for this report include the PCB analytical results of co-located plant and soil data from the exposed sediment area of the former Trowbridge Impoundment, and PCB data for great horned owl eggs and blood serum.

2.5.2 Ecological Impact Field Reconnaissance

Arcadis JSA/Geraghty & Miller conducted field reconnaissance of the Kalamazoo River riverine habitat on June 13 and 14, 2000 to document the ecological conditions (physical habitat and biota) currently existing within the Site. This information was used in combination with information regarding remedial alternatives developed in the FS Report (BBL, 2000b) to assess potential impacts to physical habitat and associated biota associated with each remedial alternative.

In order to gather the needed information, qualitative, reconnaissance-level field habitat surveys of the Kalamazoo River were conducted by boat and helicopter. The resulting information was compiled and evaluated to develop a qualitative, categorical characterization of the Site. The reconnaissance efforts are described in detail in the *Evaluation of Potential Ecological Impacts Associated with the Remediation of Contaminated Sediment - Kalamazoo River NPL Site, Michigan* report, included as Appendix S-3.

2.6 Other Physical Data

In addition to sample collection and analysis to support RI/FS objectives, specific physical studies were conducted to provide data that would reduce uncertainty in the cost and effectiveness evaluations of remedial alternatives and further support the development and use of a PCB fate and transport model.

2.6.1 Remote Sensing Surveys

Remote sensing technologies were used to obtain comprehensive information on the distribution of sediment types within the different river reaches. A GPS navigational tool was used with a reference station to provide precise (± 1 meter) positions of survey vessels. The remote sensing surveys were conducted along pre-selected primary tracklines oriented parallel to each other at various spacings within the river reaches, with "tie" tracklines generally oriented perpendicular to the primary survey tracklines. Confirmatory observations to supplement the geophysical depth measurements were made during the remote sensing investigation by push-probing.

> Extensive physical data were collected in 2000 to finely characterize the sediments and bottom conditions of the Kalamazoo River. Using sonar and other techniques, a detailed profile of the river bottom will soon be available for the first time.

The primary objectives of the remote sensing investigation were to:

- Collect hydrographic data to support the mapping of bottom topographic features of the lakes and river;
- Collect side scan sonar data that, together with historical sediment sample and probe data, will aid in the mapping of surficial sediments in the lakes and river; and
- Collect acoustic subbottom profiling data to determine sediment thickness in the lakes and river.

Data from sediment characterization by remote sensing are currently being processed to allow information to be depicted graphically. This information is not available as of the preparation of this report.

2.6.2 Sediment Resuspension Assessment

Sediment cores were collected from areas of cohesive sediment (fine-grained silts and clays) and non-cohesive sediment (sands, gravels) for use in determining Site-specific sediment resuspension properties using the Sedflume test methods. The tests were conducted on sediments collected from 32 locations

> Scientists from the University of California at Santa Barbara have tested sediments from several Kalamazoo River impoundments for purposes of determining sediment resuspension properties. The program is intended to provide important input to the KALSIM fate and transport model.

within the three MDNR-owned former impoundments and the existing Otsego City, Allegan City, and Lake Allegan impoundments. Sampling locations included areas with significant fine-grained and coarse-grained deposits. Exact core

locations within each reach were established through field reconnaissance and review of information obtained from the physical descriptions and geotechnical analyses of the sediment cores.

The resuspension tests were conducted on site under the direction of Dr. Wilbert Lick of the University of California at Santa Barbara (UCSB). The Sedflume test methods that were employed were consistent with those developed through investigative studies in the Fox River (Wisconsin), Grand River (Michigan), Trenton Channel (Detroit River, Michigan), Long Beach Harbor (California), Grasse River (New York), and New York Harbor (New York) sites. The results of the tests will be used in the refinement of the sediment and PCB fate and transport model described in subsequent sections of this document.

2.6.3 Geotechnical Sampling Program

Sediment cores were collected during the fall of 2000 from Morrow Lake and the Kalamazoo River between Morrow Dam and Lake Allegan Dam and analyzed for geotechnical characteristics. Specific objectives of geotechnical sampling were to:

- Characterize the physical properties of sediment;
- Provide data necessary to more accurately describe and develop costs for remedial alternatives contemplated in the FS Report (BBL, 2000b); and
- Evaluate the relationship among the physical properties, transport characteristics, and PCB concentrations in the sediment.

Detailed geotechnical data were collected from 50 sediment cores in the Kalamazoo River plus an another 16 cores in Morrow Lake. These physical data are important for assessing how the sediment bed would react to the various remedial actions considered in the FS Report.

The results of the geotechnical characterization of sediments will be used to assess the factors that affect resistance to scour and transport for consideration in the sediment and PCB fate and transport model. In addition, physical characteristics of sediment will be considered when refining the design of remedial alternatives that necessitate significant handling of sediments or construction of remedial measures that require knowledge of sediment properties.

Sediment cores were collected for analysis of geotechnical properties at 50 locations in the Kalamazoo River between Lake Allegan Dam and Morrow Dam, and 16 locations in Morrow Lake. Sampling locations targeted only fine-grained

or mixed sediment. Coarse-grained sediments usually behave predictably, are better sorted, and tend not to have elevated PCB and therefore are less likely to require remediation. Cores were collected and analyzed for Atterberg Limits, organic content, particle size distribution, moisture content, and dry bulk density. In-situ vane shear tests were conducted at specified depth intervals adjacent to the core samples locations.

2.6.4 Riverbank Erosion Investigation

Preliminary estimates of the potential magnitude of continued PCB loading from the river banks in the MDNR's three former impoundments (see RI Report [BBL, 2000a]) highlighted the importance of obtaining more accurate estimates of loading from this source. Two methods were employed in 1999 and 2000 to quantify the rate and characteristics of the erosion occurring along the riverbanks within MDNR's three former impoundments.

In 1999 and 2000, additional field work was conducted to estimate rates of PCB loading and transport from the eroding riverbanks within the three former impoundments. Through comparison of 1993 and 1999 data and installation of surveyed erosion pins, accurate measurements of erosion losses are available to quantify how important this source of PCB is relative to other sources and future conditions.

Locations that were originally surveyed in 1994 were resurveyed in 1999 to estimate how much material (and PCB) has eroded into the river over that time period. Secondly, erosion pins were placed at surveyed locations in 2000 to enable more precise physical measurements of riverbank loss over time. These activities provide important data for quantifying rates of PCB loading and transport into and within the river.

Evaluations were performed to specifically assess the stability/erodibility of the riverbanks and rates of erosion of the exposed sediments in the former impoundments. Sloughing of these sediments into the river occurs as the bank is undercut and as the sediments develop desiccation cracks from periodic wetting and drying. This subsection describes the survey of river transects and placement of erosion pins conducted for studies designed to determine rates of riverbank erosion.

2.6.4.1 Former Impoundment Transect Survey

Selected sediment transects established and surveyed in 1993/1994 during the RI were resurveyed in January 1999 to define the bank shape from the top-of-bank to the bottom of the river bed at each end of the transects. The riverbanks were resurveyed at five transects in each former impoundment selected to represent spatial and physical variability along the river's edge. Detailed horizontal and vertical measurements of specific locations from the two surveys were

compared to determine the change in bank shape and slope, and to assess whether significant erosion or slumping of banks had occurred between 1994 and 1999. Details of the physical characterization are provided in Appendix S-4.

2.6.4.2 Placement of Erosion Pins

Results of the 1999 resurvey of former impoundment banks (described above) indicated that PCB loading from the exposed sediment is significant relative to annual PCB transport in the Kalamazoo River water column. To reduce uncertainty associated with estimates of loading, a more structured monitoring program was initiated in which grids of surveyed erosion pins were installed on the exposed sediment banks. The pins will be measured on an annual basis to determine an accurate rate of loss. Specific objectives of erosion pin placement were:

- To estimate the rate of bank erosion within each of the three former impoundments;
- To estimate the volume and mass of solids and PCB contributed by the banks of each former impoundment to the river on an annual basis; and
- To monitor changes in the channel shape and bank configuration over time.

The measurement of erosion rates will be accomplished through periodic survey of a series of pins installed in spring and summer 2000, which will serve as a stationary baseline and aid in monitoring the changes in bank and channel topography over time. Erosion pins were placed at 15 transect locations established in 1993, consisting of three closely spaced subtransects at each of five transect locations in each of the former impoundments (Table 2-3). On the order of 16 pins were placed at each subtransect. Transects to be monitored for erosion were selected to represent a variety of conditions ranging from low to high erosion potential.

Changes in the banks will be measured at the erosion pins by resurveying the bank along each transect periodically. Rates of erosion (or deposition) will be estimated by dividing the distance of bank retreat by the time between measurements. The volume and mass of eroded material will be derived by calculating the cross-sectional differences between the bank profiles over time, in conjunction with soil properties determined during the former impoundment investigation. By clustering groups of three erosion pin transects, localized spatial variations in erosion characteristics may be estimated and accounted for.

2.6.5 Lake Allegan Diver Survey

Lake Allegan was surveyed by a commercial diving company to determine general conditions of the sediment bed and in particular report on the presence of obstructions such as trees, tree stumps, boulders, and other obstacles that might affect work activities potentially contemplated for the lake bottom. Bottom depths measurements were taken using a depth gage, fathometer, and a survey rod. A hand-held GPS unit was used to locate

Lake Allegan is a very large impoundment that still contains remnants of pre-impoundment features that are now submerged. These old tree stumps, rocks, and other obstacles and debris would pose serious problems for implementation of the capping or dredging alternatives evaluated in the FS Report. Thus, a diving team has surveyed and documented these conditions in the lake.

obstructions and various points of interest, and photographs were taken at several locations throughout the lake. The inspection report is included as Appendix S-5. This work was conducted in August 2000 when limitations of the remote sensing operations became apparent.

Inside Section 1 – Introduction

Inside Section 2 – Additional Site Characterization

Inside Section 3 – Updated Site Assessment

Inside Section 4 – Evaluation and Comparison of Remedial Alternatives

✦ Results available to date from the supplemental studies provide multiple lines of evidence to support the conclusion that PCB concentrations in sediment, surface water, and fish are declining. In addition, the initial phase of a comprehensive ecological risk assessment and a reevaluation of the MDEQ's human health risk assessment both reveal that original estimates of risk were substantially overestimated.



What new information is currently available?

- New data and information updated through supplemental studies in 1999 and 2000 (most of the RI data were collected in 1993 and 1994).
- New Site-wide habitat characterization data and physical mapping of the sediment bed.
- New human health and ecological risk assessments are underway to extend MDEQ's initial screening-level assessments.
- New computer-based comprehensive model of the Kalamazoo River and how PCB and sediment behave in the system. This new tool is being used to quantitatively evaluate the performance of remedial alternatives.

Why is the MDEQ ecological risk assessment being reevaluated?

The screening-level ecological risk assessment conducted for the MDEQ used overly conservative PCB exposure factors to estimate risks to wildlife drawn in part from literature, as opposed to using Site-specific from the Kalamazoo River. The KRSG's ecological studies that are currently underway will provide the site-specific information needed to complete a comprehensive baseline risk assessment using state-of-the art methodologies.

Why is the MDEQ human health risk assessment being reevaluated?

A second human health risk assessment is underway that incorporates recently available data and more refined, up-to-date methods than those used in MDEQ's screening level assessment to evaluate risks. To estimate risks associated with eating fish – the primary PCB exposure pathway for humans – the second risk assessment uses a probabilistic approach that is endorsed by the USEPA because it yields a more comprehensive characterization of risk. In addition, the second study is using more realistic exposure assumptions for gardeners, hunters, and fishermen using the former impoundments.

3. Updated Site Assessment

The additional data described in Section 2 were used to update and supplement information obtained during the RI/FS. Although much of these data collection activities have been completed as of the writing of this report, further field studies remain. In addition, most laboratory analytical data are as yet unavailable due to the higher priority given by BBL and the laboratory to the production of data under the MDEQ-approved work plans. The data that are available from this work are reported in this section to update the Site Conceptual Model originally presented in Section 7 of the RI Report (BBL, 2000a), and to augment existing data for the development and application of the PCB and sediment fate and transport model, also which is summarized in this section. Other supplemental study results presented in this section include the initial results of ongoing Site-specific studies being conducted by Dr. John Giesy of MSU to further evaluate potential risks to ecological receptors associated with exposure to PCB. The human health risk assessment (HHRA) prepared by CDM on behalf of the MDEQ also is reevaluated in this section with a critical analysis of data, assumed exposure factors, and the results of the Kalamazoo River angler survey recently published by the ATSDR (2000).

The findings of the RI Report (BBL, 2000a) were based on data collected primarily in 1993 and 1994. In the six or more years since then, a substantial amount of new data have been generated as a result of the activities described in Section 2 and the Supplemental Studies Work Plan (Appendix S-1). These studies are continuing and are a source of valuable information about the transport, effects, and fate of PCB in the Kalamazoo River, and the effectiveness of the remedial alternatives evaluated in the FS Report (BBL, 2000b). In general, the additional data and other information confirm the findings of the RI Report (BBL, 2000a), reduce uncertainty related to the evaluation of the relative

Section Summary

Results of the substantial additional studies conducted to update and supplement the Kalamazoo River RI/FS are reported in this section. Primary conclusions include:

- New data collected in 1998 and 2000 show continued decreases in PCB levels in fish, surface water, and surface sediment.
- The new data are consistent with trends previously predicted based on earlier sampling or monitoring programs, and further confirm that natural attenuation is continuing to reduce PCB bioavailability and potential risk.
- Phase I of a comprehensive baseline ERA conducted by Giesy Ecology, Inc. Scientists conclude there is no risk to songbirds and small mammals associated with exposure to exposed sediments within the three former impoundments.
- A reevaluation of MDEQ's human health risk assessment reveals several instances of overestimation of risks and other problems with methodology in the initial assessment. Using up-to-date data and more rigorous analytical methods, human health risks are shown to be substantially lower than originally estimated.

A sophisticated tool is now available to aid decision makers in determining the relative benefits and impacts of different remedial strategies. The KALSIM fate and transport model was designed specifically for the Kalamazoo and is being used to predict how the system will react to various remedial actions considered in the feasibility study.

effectiveness of remedial alternatives allow further development of the fate and transport model, and thereby further support selection of the preferred remedy at the Site (presented in Section 6 of the FS Report [BBL, 2000b]).

A preferred remedy was identified in the FS Report (BBL, 2000b) based on a number of assumptions and simplified estimates that have been subsequently validated by information obtained from these supplemental studies. As discussed in this section and Section 4, the additional data currently available are significant with respect to evaluations of the implementability of remedial measures within the Kalamazoo River and, in particular, Lake Allegan.

3.1 Update to Conceptual Site Model

Section 7 of the RI Report (BBL, 2000a) presents a conceptual Site model of the Kalamazoo River system, which attempted to integrate and distill the entire body of findings from the RI and risk assessments into a brief overview of the major factors governing system dynamics and potential risks.

Two of the primary conclusions embodied in the conceptual model, which are revisited based on additional findings, are:

- Uncontrolled external sources continue to add PCB to the river; and
- PCB available for transport or biological uptake are decreasing.

These findings are discussed in the following subsections.

3.1.1 Uncontrolled External Sources of PCB Within the Kalamazoo River System

A significant factor to be considered when evaluating potential remedial alternatives for the Site is the negative impact that continuing external PCB sources have on the Kalamazoo River relative to the potential benefits of any sediment remediation effort. There are ongoing uncontrolled sources of PCB to the Kalamazoo River which will ultimately control the levels of PCB in surficial sediment and fish unless they are mitigated. This section discusses supplemental information regarding two of the three major uncontrolled sources of PCB to the Kalamazoo River discussed in the RI Report (BBL, 2000a):

- Upstream sources; and

- MDNR-owned former impoundments.

Recently collected data confirm that each of these sources continues to be a factor in PCB transport within the Site.

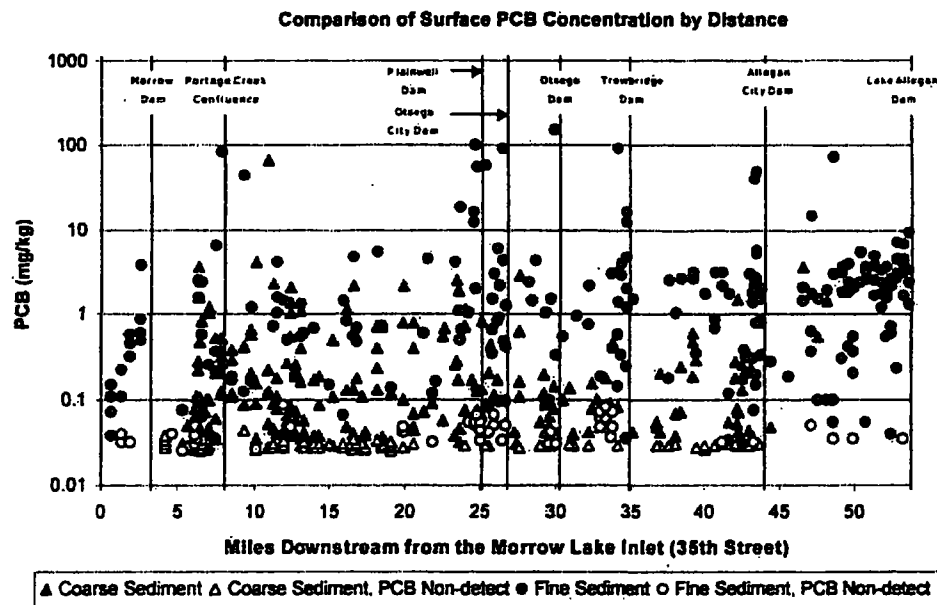
Upstream Sources

PCB continue to move into the Site from upstream sources. It is estimated that approximately 2,800 kilograms (kg) of PCB are contained in Morrow Lake sediments. PCB levels measured in Morrow Lake surface water and fish exceed both MDEQ surface water quality standards and acceptable risk thresholds identified in the MDEQ's HHRA (CDM, 2000b). The remedy for the Site must consider the current exceedances of these criteria in Morrow Lake and address the potential impact of upstream and external sources of PCB to the downstream reaches of the river.

Surface water data collected from the River Street sampling location from March to July 2000 confirm that Morrow Lake continues to provide PCB to the Site. The River Street sampling location is downstream of Morrow Dam, but upstream of KRSG facilities and operable units (OUs). PCB were detected in samples from River Street in 8 of 18 sampling events, at an average concentration of 0.0036 micrograms per liter ($\mu\text{g/L}$) (acknowledging non-detects). PCB were not detected in any of the 18 samples collected from the East Michigan Avenue (Galesburg) sample location upstream of Morrow Lake during the same sampling events. The surface water data are presented in Appendix S-11. These data corroborate data collected by the MDEQ from the Kalamazoo River and Portage Creek in 1999 and 2000, which also show detectable PCB concentrations upstream of the KRSG facilities. PCB levels in surface water entering the Site need to be considered in the development of remedial alternatives, especially if surface water criteria are used as a benchmark of remedial success. The estimated PCB load at the River Street location, based on data collected in March through July 2000, is approximately 2.4 kilograms per year (kg/yr). By contrast, the estimate of PCB transport made in the RI Report (BBL, 2000a) based upon the 1993 and 1994 measurements was 10 kg/yr at this same location.

PCB contributions from upstream of the Site may also occur via sediment transport from Morrow Lake or further upstream. Average TSS concentrations were higher in those samples with detectable PCB levels (average TSS of 17.1 milligrams per liter [mg/L]) than in samples where PCB were not detected (average TSS of 12.6 mg/L). Furthermore, four of the eight samples in which PCB were detected were collected during a high-flow event. Average flow when PCB were detected was 1,250 cubic feet per second (cfs) compared to 1,020 cfs for samples with non-detectable PCB (based on United States Geologic Survey [USGS] data from Comstock sampling location). It should be noted that overall, the surface water data indicate Morrow Lake is a depositional environment; the average TSS downstream of the lake is roughly half the TSS concentration upstream of the lake.

The ongoing investigations described in Section 2 include sampling to characterize the distribution of PCB in the sediment of Morrow Lake and assess the potential for the sediment bed to provide PCB to downstream reaches of the Kalamazoo River. At the time of this report, preliminary data show PCB levels in Morrow Lake sediment to range from not-detected to 3.9 milligrams per kilogram (mg/kg) in the surface sediment with an arithmetic average of approximately 0.52 mg/kg. As shown in the graph below, these concentrations are not inconsistent with surface PCB concentration in most of the river downstream, as measured in 1993 samples. By comparison, PCB in surface samples collected from Morrow Lake in 1988 by the MDEQ ranged from 0.29 mg/kg to 2.4 mg/kg with an arithmetic average of 0.87 mg/kg.



MDNR-Owned Former Impoundment Exposed Sediment

Data indicate that the largest uncontrolled external sources of PCB to the Kalamazoo River are the exposed sediments of the three MDNR-owned former impoundments. These former sediments were submerged within the Kalamazoo River until the early-1970s when the MDNR permanently opened the Plainwell, Otsego, and Trowbridge dams, which drew down the impounded water 5 to 10 feet to current levels. Prior to drawdown, these impoundments were quiescent, depositional basins occupying approximately 510 acres. Drawdown of water within the former impoundments released and redistributed approximately 1.1 million cubic yards (cy) of sediment containing an estimated 15,000 kg of PCB to downstream reaches of the Kalamazoo River (see Appendix F of the RI Report [BBL, 2000a] for details). This dramatic

change in river geometry created approximately 10 miles of new river channel running through the formerly submerged sediments within the three former impoundments. The banks of these 10 miles of new channel, which contain PCB and are 3 to 4 feet high in many areas, remain sources of PCB to the river via erosion.

The RI Report (BBL, 2000a) established the significance of erosion of the exposed sediment as a continuing PCB source to the river. Using simple calculations and assumptions, it was estimated that a total of 10 to 100 kg/yr of PCB annually could be contributed from the three impoundments. To refine this estimate, in January 1999 the banks within each of the former impoundments were re-surveyed at locations previously surveyed in 1993 and 1994. These 1999 survey data were compared to 1993/1994 survey data to evaluate changes in bank position that occurred over that 6 year period. Plots of the 1993/1994 and 2000 bank profiles provided in Appendix S-4 show conclusively that erosion and slumping of the banks is actively occurring. Using the cross-sections, the total annual mass of PCB loaded to the river from the three impoundments was estimated to be 31 kg: 10 kg from the former Plainwell Impoundment, 5 kg from the former Otsego Impoundment, and 16 kg from the former Trowbridge Impoundment (calculations are provided in Appendix S-4). These estimates are consistent with those derived using broad assumptions in the RI Report (BBL, 2000a), and indicate the necessity for regular measurement of erosion from these areas. As described in Section 2, a more precise investigation was initiated in the summer of 2000, the preliminary results of which will be available in summer 2001.

An annual PCB loading rate of 31 kg is significant relative to the observed PCB transport in the Kalamazoo River surface water. It exceeds the observed fluxes at most locations where surface water was sampled. The calculated PCB loading from the banks reinforces the conclusion in the RI Report (BBL, 2000a) that, over time, the contribution from the three former impoundments will increase in importance in controlling PCB transport and downstream surface sediment and fish concentrations. The exposed sediments in the former impoundments are a major identifiable and controllable source of PCB that must be addressed in the future remedy for the river.

3.1.2 Decreasing PCB Availability for Downstream Transport or Biological Uptake

The significant downward trends in PCB levels in surface sediment, surface water, and fish demonstrated in the RI Report (BBL, 2000a) are further supported by supplemental data collected in 1999 and 2000. These analyses show that, despite the presence of continuing sources of PCB to the system, PCB levels in fish and surface water have declined steadily since the

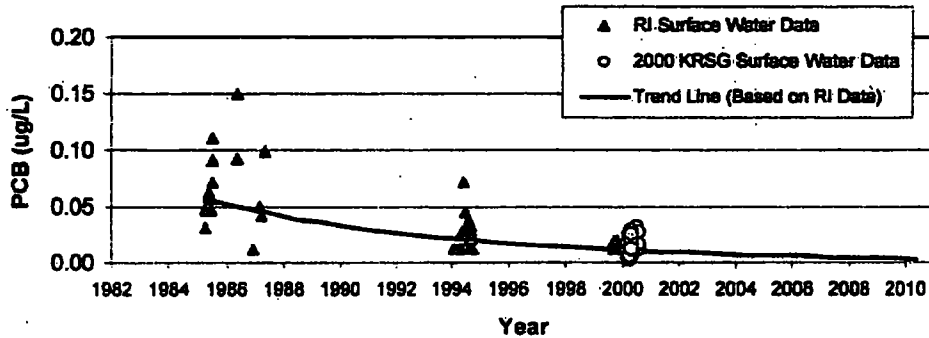
mid-1980s. These trends indicate that past source control and ongoing natural attenuation processes are reducing the availability of PCB for downstream transport or biological exposure. These processes have been verified in the Kalamazoo River system and consist primarily of the physical process of sedimentation and burial. There is also evidence of the natural decomposition of PCB by anaerobic dechlorination occurring in sediments, although its extent remains to be quantified. Supplemental data collected by the KRSG in 2000 support the trends identified in the RI Report (BBL, 2000a), as discussed below.

- > PCB concentrations in fish, surface water, and surface sediment are declining as a result of source control and natural attenuation processes.
- > Bioavailability of PCB is also declining due to natural attenuation processes, reducing risk to human and ecological receptors.

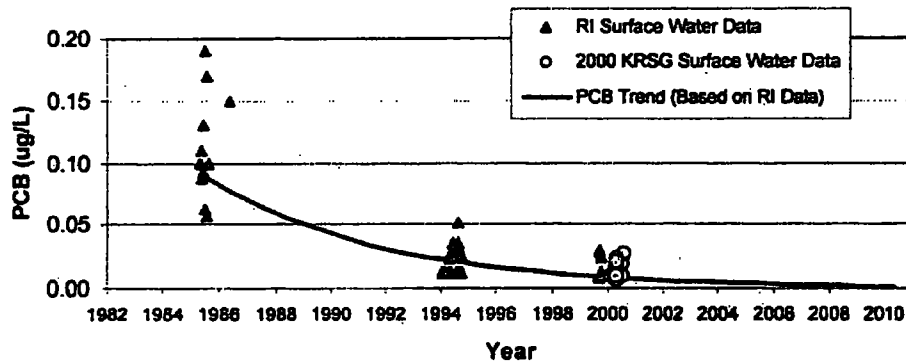
Surface Water

Statistically significant downward trends in surface water PCB concentrations at the Plainwell sampling location and downstream were described in the RI Report (Section 5.2) (BBL, 2000a) based on MDEQ data from the 1980s, the 1994 RI, and MDEQ 1999/2000 sampling efforts. In addition to these data, the KRSG has been collecting surface water data to further evaluate temporal trends. To date, data from March to July 2000 have been received and validated through quality assurance/quality control (QA/QC) review. These data are presented in Appendix S-11 of this document, and are summarized along with previous data below.

PCB Concentrations at Plainwell

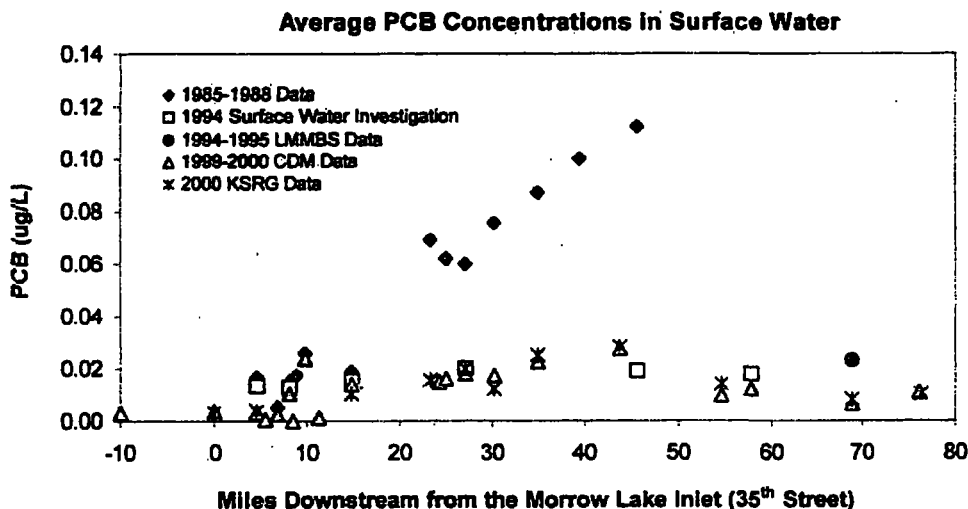


PCB Concentrations for Allegan City Dam to Lake Allegan Dam



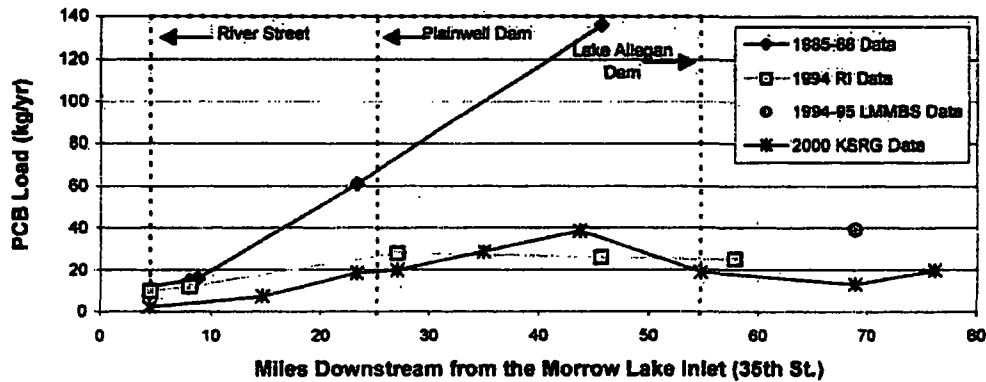
The above graphs were reproduced from the RI Report (BBL, 2000a) with the addition of 2000 KRSG surface water data from similar locations. As shown by these plots, the recently collected KRSG data are consistent with the downward trend in PCB concentrations in surface water downstream of Plainwell demonstrated in the RI Report (BBL, 2000a). It should be noted that the data presented in the above graphs represent samples collected over a wide range of flows, temperatures, and TSS values. Upon completion of the surface water sampling program in March 2001, a complete trend analysis will be conducted that will account for the inter-relationships among these factors.

Preliminary results obtained from the 2000 KRSR surface water sampling are consistent with the results of the MDEQ 2000 data (see graph below). The combined data from the KRSR and MDEQ 2000 surface water investigations reflect a significant decline in PCB concentrations (especially in the downstream portions) when compared with PCB data from the mid- to late-1980s and 1994. For example, all of the average PCB concentrations downstream of D Avenue (located just downstream of the northern Kalamazoo City boundary) were lower in 2000 than observed in the past during both baseflow and high-flow conditions.



Annual PCB loads estimated from the 2000 data indicate further decreases of PCB transport since 1994 at most locations. PCB load estimates using a flow-stratified method (consistent with that used in the RI Report [BBL, 2000a]) are provided in Table 3-1. Estimated loads at locations consistent with the 1994 data include 2.4 kg/yr at River Street, 19 kg/yr at Plainwell, 29 kg/yr in the Allegan City Impoundment, and 19 kg/yr at Lake Allegan Dam. At 58th Street near New Richmond, where Lake Michigan Mass Balance Study (LMMBS) data were collected in 1994/1995, the 2000 KRSR data indicate an annual PCB load estimate of 13 kg/yr, approximately one-third of the load observed in 1994/1995. Spatially, the 2000 KRSR data show an increase of PCB load between the D Avenue and Plainwell sampling locations, as was observed in the mid-1980s and again in 1994, but the gradient was smaller than historically observed. Similar to the 1994 RI data, the observed PCB load is relatively consistent over distance downstream of Plainwell.

Estimated Annual PCB Load in the Kalamazoo River



Fish

The most compelling indication that natural attenuation is occurring in the Kalamazoo River is embodied in the fish database, which includes data collected during the initial RI field studies conducted in 1993 as well as monitoring data collected in 1997 and 1999. The results of the 1999 fish investigation are presented in Appendix S-2, and a summary of the 1999 fish data is provided in Table 3-2.

Between the mid-1980s and 1999, wet-weight PCB levels in smallmouth bass, an important sport fish on the Kalamazoo River, have fallen from an average of 0.89 mg/kg to 0.23 mg/kg in Morrow Lake, from an average 1.8 mg/kg (1993) to 0.49 mg/kg in the former Plainwell Impoundment, and from an average 2.8 mg/kg to 0.56 mg/kg in Lake Allegan. Corresponding half times estimated from regression analyses of these data are 3.7, 3.2, and 4.5 years, respectively. PCB levels in carp fillet also are falling but not as rapidly, with half times estimated at 4.2, 11, and 6.2 years in Morrow Lake, the former Plainwell Impoundment, and Lake Allegan, respectively.

The 1999 fish data confirm the trends observed in the RI Report (BBL, 2000a) of declining fish PCB concentrations over time. Figures 3-1, 3-2, and 3-3 show the fish PCB concentration trends at Morrow Lake, Plainwell, and Lake Allegan, as derived in the RI Report, with the addition of the 1999 data. As shown on these figures, the 1999 data are within the range of expected PCB concentrations predicted by regression analysis presented in the RI Report (BBL, 2000a). The 2000 fish data from Plainwell and Lake Allegan were also used to update the multivariate trend analysis provided in the RI Report (BBL, 2000a). That analysis, using methods from Stow (1995), showed a significant downward trend of PCB in fish with time after accounting for such variables as lipid content, length, and weight. The

same conclusions are drawn when the 2000 data are included in the analysis, although the resulting rates of PCB decrease are slightly lower.

Further evidence of improvement in fish PCB concentrations over time is apparent when the data are compared to Michigan Department of Community Health's (MDCH) fish consumption advisory criteria (MDCH, 2000a). Appendix S-6 presents the comparison of 1997 and 1999 fish data to the criteria, and then compares the applicable advisories to those actually in effect for the river. Based on the most recent data, the fish consumption advisories should be relaxed to a greater degree than that indicated in the RI Report (BBL, 2000a), as follows:

- Between Morrow Dam and Lake Allegan Dam, the advisory for the general population consumption of smallmouth bass can be revised from one meal/week to unlimited consumption;
- Between Morrow Dam and Lake Allegan Dam, the advisory for children and women of child-bearing age regarding the consumption of smallmouth bass can be revised from six meals/year to one meal/month; and
- Between Lake Allegan Dam and Lake Michigan, the advisory for children and women of child-bearing age regarding the consumption of smallmouth bass can be revised from six meals/year to one meal/month.

Sediment

The RI Report (BBL, 2000a) quantified the rate of decrease in surface sediment PCB concentrations based on finely-sectioned cores from the Allegan City Impoundment and Kalamazoo Lake. Data from these cores yielded rates of decline and respective half-times that were consistent with those observed in fish and surface water data. New cores collected by the KRSG in 2000 from each of the existing and former impoundments were finely sectioned and analyzed for PCB and radionuclides. The radionuclide data received to date are presented in Appendix S-7. PCB data are not currently available, but it is anticipated they will provide information by which the trends of PCB concentrations in newly deposited sediment can be evaluated and compared to historically deposited sediment. These data will provide a more spatially complete record of these trends.

Taken together, these sediment, surface water, and fish data provide multiple lines of evidence that support the conclusion that natural attenuation processes are active in the Kalamazoo River and are significantly decreasing PCB bioavailability and concentrations over time. Moreover, in the presence of additional source controls, the benefits of these natural processes would be expected to be enhanced, thus hastening achievement of the central goals of reducing

fish PCB concentrations and the associated potential exposure risks to humans and wildlife who consume fish from the Kalamazoo River.

3.2 Ecological Risk Assessment

This section provides a summary of the initial results of the first phase of a baseline ERA being conducted by Giesy Ecotoxicology, Inc., under the direction of Dr. John Giesy of MSU. Data presented here represents the initial phase (Phase 1) of a comprehensive three-year Site-specific evaluation of risk to ecological receptors due to exposure to PCB in the Kalamazoo River Area of Concern. This initial phase focuses specifically on risk posed to terrestrial ecological receptors by PCB in exposed sediments in the three MDNR-owned former impoundments. The report describing the results of this initial phase of Giesy's ERA is presented in Appendix S-9. The work plan describing the full suite of studies being conducted in Giesy's ERA is attached to the Supplemental Studies Work Plan in Appendix S-1.

3.2.1 Background

An initial screening-level ERA was conducted by CDM on behalf of the MDEQ in 1999 (CDM, 1999a). CDM issued an addendum to the 1999 MDEQ ERA in 2000 (CDM, 2000a). Both of the MDEQ assessments used screening-level methodologies to evaluate potential risk to receptors exposed via the food chain and incidental sediment/water ingestion pathways in the river and the exposed sediments in the three former impoundments. The MDEQ's assessment concluded that certain groups of ecological receptors are not likely at risk, while other receptors may potentially be at risk (CDM, 1999a).

Receptors not indicated to be at risk (i.e., those having hazard quotients [HQs] <1) based on conservative dose modeling, and the use of conservative toxicity reference values (TRVs) based on no observable adverse effects levels (NOAELs) as presented in the MDEQ ERA (CDM, 1999a), include great horned owl, muskrat, aquatic invertebrates, and fish including smallmouth bass, sucker, and carp. Receptors reported by the MDEQ (CDM, 1999a) to have NOAEL-based HQs greater than one (and therefore are potentially at risk) include receptors that are primarily exposed through the aquatic food chain (e.g., mink and bald eagle) and receptors that are exposed through the terrestrial food chain (e.g., the American robin, deer mouse, and red fox). Predictions of risk for the terrestrial receptors were driven largely by literature-derived estimates of PCB concentrations in plants consumed by these receptors. Scientists reviewing these analysis on behalf of the KRSG expressed concern that CDM had substantially overestimated the actual concentrations of PCB in plants growing in the exposed sediments in the former impoundments (Giesy, 1999; Jenkins, 1999).

The addendum to the MDEQ ERA (CDM, 2000a) used two approaches to re-evaluate risks to great horned owl. The first was based on an evaluation of dietary exposure similar to that employed in the original MDEQ ERA (CDM, 1999a). The results of this evaluation validated the conclusions of the 1999 assessment, once again indicating there to be no risk to the great horned owl from dietary exposure. In addition to the dietary-based HQ calculation, the MDEQ ERA addendum (CDM, 2000a) conducted a tissue-based HQ evaluation for the great horned owl (CDM, 2000a). This second approach used measured concentrations of PCB in three great horned owl eggs. These data were compared to a published egg residue-based measure of effect to evaluate risk. Although this assessment indicated, according to the MDEQ, that the potential for risk may exist, a number of concerns were raised regarding the origin of the eggs, the quality of the data, and the relevance of the data for characterizing risk for the Kalamazoo River (Brown, 2000). (Although requested by the KRSG, no documentation regarding the sample locations, sampling methods, analytical methods, or related study designs related to the owl eggs has been made available by the MDEQ for review as of the submission of this document).

The ERA being conducted by Giesy was designed to provide a detailed Site-specific evaluation of risks to populations of aquatic and terrestrial receptors associated with the Kalamazoo River (Appendix S-9). The first phase of this ERA represents a Site-specific refinement of the screening-level predictive assessments conducted by the MDEQ for receptors associated with the exposed sediments in the former impoundment (i.e., American robin, red fox, deer mouse, and great horned owl). Future phases of the ERA will incorporate additional evaluations of the mink, bald eagle, swallow, bluebird, and short-tail shrew as relevant data become available.

3.2.2 Reevaluation of Risk Based on results of the Phase 1 ERA

Results of the screening level ERA conducted by the MDEQ (CDM, 1999a) suggested that PCB in the Kalamazoo River theoretically could pose a risks to terrestrial ecological receptors including the robin, mouse, and fox. These predicted risks were due primarily to the predicted exposure of terrestrial receptors to PCB from the consumption of plant tissue in the three former impoundments. Because plant tissues in the former impoundments had not been directly measured, the MDEQ estimated PCB concentrations in plants using literature-derived bioaccumulation factors (BAFs) for the transfer of PCB from soil to plants. Using these estimates, the MDEQ calculated dietary exposure-based HQs of greater than 1.0 for the American robin, white-footed mouse, and red fox. However, when measured Site-specific concentrations of PCB in plants collected in Phase I of Giesy's ERA were substituted for literature-derived estimates, the resulting HQs for each of these terrestrial receptors were less than 1.0, indicating no risks due to PCB exposure, based on the NOAEL.

The use of actual measured values in Giesy's ERA resulted in estimated exposures for the plant portion of the American robin diet that are approximately 900-fold and 200-fold less than were estimated in the MDEQ ERA (CDM, 1999a) and addendum (CDM, 2000a), respectively. These results indicate that the predictions of risks to robins, mice, and foxes in the MDEQ ERA (CDM, 1999a) were significantly overestimated due to the application of overly conservative BAFs for the transfer of PCB from soil to plants. Based on these Site-specific data, the Phase I Giesy ERA concludes that there is no evidence of risk due to PCB exposure to the terrestrial receptors (e.g., robins, mice, and foxes) considered in the MDEQ ERA.

With regard to the estimates of risks to owls based on concentrations of PCB in three great horned owl eggs (CDM, 2000a), Giesy's ERA identified several basic problems. These include:

- The location and timing of the collection of these eggs limit their relevance in evaluating current risk in the former impoundments;
- Data collected during the initial phase of Giesy's ERA indicate that the data from the three eggs used by CDM in the addendum to conduct the screening-level ERA (CDM, 2000a) may not be representative of current conditions in the area they were collected (i.e., the Allegan State Game Area), much less the entire river; and
- The literature-derived toxicity threshold used in the addendum to the screening-level ERA is inappropriate and substantially overestimates risk.

These issues are discussed briefly below.

In the addendum to the MDEQ ERA, the risks to owls were reconsidered based on concentrations of PCB in three great horned owl eggs collected from the area downstream of Lake Allegan (i.e., the Allegan State Game Area) in the early 1990s (CDM, 2000a). Based on the locations from which the owl eggs were collected, the initial phase of Giesy's ERA concluded that it is unlikely that the floodplain soils were a major source of the PCB that were accumulated in the owl eggs. Unless a link between the floodplain soils and the eggs collected can be established, is inappropriate to use these data to evaluate risk to great horned owls foraging in the former impoundments.

Giesy's ERA further questioned the representativeness of the concentrations of PCB in great horned owl eggs collected in the Allegan State Game Area presented in the addendum (CDM, 2000a). The data for these three great horned owl eggs had arithmetic and geometric mean concentrations of PCB of 43.1 mg/kg and 31.9 mg/kg, respectively. Data from the MSU-Aquatic Toxicology Laboratory studies are available for three great horned owl eggs that were collected in early 2000 from the Allegan State Game Area. State-of-the-art congener-specific PCB analysis of these eggs resulted

in arithmetic mean and geometric mean concentrations of 6.1 mg/kg and 3.0 mg/kg, respectively. Note that these concentrations are much less than previously analyzed samples from similar areas.

Giesy's ERA also raised serious questions regarding the appropriateness of the egg-based toxicity threshold presented in the screening-level ERA. This NOAEL based TRV for owls of 1.3 mg/kg wet-weight in eggs is derived from data for bald eagles. The primary source of these data (Wiemeyer et al., 1984) does not support a TRV of 1.3 mg/kg, but rather states that a PCB concentration of 7.2 mg/kg in bald eagles eggs is associated with successful nests. Thus, the literature from which this TRV was derived does not provide support for the TRV value in the MDEQ ERA. Furthermore, the authors of this paper (Wiemeyer et al., 1984) clearly state that "it is difficult to separate the effect of PCB from those of DDE or other contaminants. We [the authors] are uncertain as to the effects of PCB on bald eagles (Wiemeyer et al., 1984)." Thus, the authors never intended that this value to be used as the basis of a TRV.

Moreover, it is inappropriate to rely on a toxicity threshold for eagles when a study on the effects of PCB in screech owls is available (McLane et al., 1980). The McLane et al. study, which was used in the MDEQ ERA as the basis of the dietary TRV for PCB in owls, also measured concentrations of PCB in eggs. Since this was a controlled laboratory study that evaluated the effects of PCB on sensitive reproductive endpoints in a closely related species, this study appears to be the most relevant for assessing the potential effects of PCB on great horned owls. No-effect levels for PCB in eggs of screech owls were reported to be greater than 18 mg/kg. At or below 18 mg/kg, there were no effects on eggshell thickness, number of eggs laid, young hatched, or young fledged (McLane et al., 1980).

Finally, Giesy's ERA concluded that additional data on PCB concentrations in owl eggs are needed to evaluate the potential effects of PCB on owls residing within the MDNR-owned former impoundments. At this time, the only relevant available information on the former impoundment owls is the concentration of PCB in owl blood serum (65 micrograms per kilogram [$\mu\text{g/kg}$]) collected in May of 2000 from a single owl fledgling from the former Trowbridge Impoundment. Using a published relationship between the concentration of PCB in eggs and plasma, the predicted concentration of PCB in the egg is approximately 8.3 mg/kg, wet-weight, for great horned owls residing in the former Trowbridge Impoundment. A no-effect level for PCB in eggs of screech owls based on eggshell thickness, number of eggs laid, young hatched, or young fledged has been reported to be greater than 18 mg/kg (McLane et al., 1980). Based on the TRV of 18 mg/kg, the 8.3 mg/kg concentration results in a HQ of 0.46, indicating there to be no risks due to PCB exposure. This result is consistent with the dietary HQs presented in the MDEQ ERA and the addendum to the MDEQ ERA (CDM, 1999a, 2000a). The initial phase of the Giesy ERA concluded that the tissue residue-based approach, although preliminary, does not support the conclusions that PCB are adversely affecting great horned owl populations in the Kalamazoo River.

Taken together, the results of initial phase of the Giesy ERA indicate that no population-level effects would be expected for the terrestrial receptors considered in the MDEQ ERA.

3.3 Human Health Risk Assessment

The subject of the HHRA discussed in this section addresses risks associated with exposure to PCB in Site media. Cancer risks are commonly discussed in terms of the additional probability of an individual developing cancer. The MDEQ has identified an acceptable threshold of increased individual cancer risk of less than 1 in 100,000 (i.e., 1×10^{-5}). The U.S. Environmental Protection Agency (USEPA) has identified an acceptable range of cancer risk from 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}). This subsection discusses two HHRA

A more thorough analysis of PCB exposure to Kalamazoo River fish consumers and recreationists who might use the areas of exposed sediment in the MDNR-owned former impoundments confirms that the exposed sediment does not present a risk to human health and that risks to people who eat Kalamazoo River fish have been substantially overestimated. The CDM (2000b) HHRA used maximum exposed sediment values in determining that exposure to recreationists exceeded safe levels. However, when average PCB levels were used, exposures are shown to be below those same thresholds. This new analyses put to greater use results of the ATSDR (2000) survey of Kalamazoo River anglers and more complete fish PCB data.

that have been completed for the Site. The first HHRA was completed by CDM (CDM, 2000b) under the direction of the MDEQ. The second was completed by Cambridge Environmental, Inc. (Cambridge) (attached in Appendix S-10) at the request of the KRSG. The receptors and exposure pathways evaluated in the two assessments are summarized in the following table.

Receptors and Exposure Pathways

Cambridge*	CDM
Hunter/Fisher - Dermal exposure and incidental ingestion of former impoundment exposed sediments	Recreator - Dermal exposure, incidental ingestion and inhalation of former impoundment exposed sediments
Trespassing gardener - Dermal exposure and incidental ingestion of former impoundment exposed sediments	Resident - Dermal exposure, incidental ingestion and inhalation of former impoundment exposed sediments
Fish Ingestion - probabilistic assessment	Fish Ingestion - three populations were assessed: central tendency sport angler, high-end sport angler and subsistence angler.

* Vapor exposure to emissions from the river near the dams shown to be negligible in the Cambridge assessment.

3.3.1 Fish Ingestion

Both the CDM (2000b) and Cambridge HHRA's evaluated PCB exposure to anglers from consumption of fish caught from the Kalamazoo River. One of the most significant differences between the two assessments is the approach used to assess exposure and lifetime risk of the fish-eating population. CDM used a deterministic approach to determine the exposure to a hypothetical population of anglers, while Cambridge used a probabilistic risk approach (PRA) using data specific to local anglers. By using a PRA, the variability and uncertainty related to human behavior and PCB levels in exposure media can be appropriately (quantitatively) characterized.

The PRA is endorsed by the USEPA because the result is a more comprehensive and accurate summary of exposure and risk estimates and associated probabilities, and it supports more informed risk management decisions (USEPA, 1999).

> One of the most significant differences between the two assessments was the approach used to assess exposure resulting from ingestion of locally caught fish. In the CDM HHRA, point estimates of a hypothetical population (deterministic approach) were calculated. A probabilistic approach using data specific to the local fish-eating population was employed by Cambridge to evaluate the fish ingestion scenario. Another significant difference was the inclusion of more recent fish tissue data in the Cambridge HHRA, as well as the incorporation of decreasing trends in fish concentration to assess future PCB exposure resulting from fish ingestion.

Another significant difference between the two assessments is that Cambridge used more recent and comprehensive fish fillet data (1993, 1997, and 1999), while CDM used only fillet data on carp and bass from 1993 and 1997. The 1999 data used by Cambridge also included more fish species (and included measurements of the fish species actually eaten in greatest quantity). Estimates of fish tissue PCB concentrations were incorporated into the Cambridge probabilistic assessment by determining the distribution of the data, and modifying the measured fish tissue PCB concentrations by expected changes in concentration over time. The time trend analysis performed by Cambridge indicates that PCB concentrations in fish are expected to decrease by about 5% per year. In contrast, CDM simply used the average (over all fish) and maximum (in any single fish) concentrations derived from the 1993 and 1997 data, with no consideration of decreasing concentrations.

Evaluation of the two HHRA's shows that consumption of locally-caught fish accounts for most of the potential human exposure at the Site. CDM's conservative, deterministic assessment suggests that potential lifetime cancer risks from fish ingestion may be as high as 1×10^{-2} for the subsistence angler. The subsistence angler is a high-end receptor whose exposure may be overestimated in the assessment through the combination of multiple conservative assumptions. The lowest risk associated with the maximum fish tissue concentration reported by CDM (5.8×10^{-4}) is for the central tendency sport angler. The probabilistic assessment of risks posed to the local angler populations (i.e., people who eat fish from the Kalamazoo River starting in 1999) calculated by Cambridge show the upper bound lifetime cancer risk

associated with the combined variability and uncertainty distribution at the 99th percentile is 7×10^{-4} . This upper bound, conservative estimate of risk, based on Site-specific data, is unlikely to occur (there is only a 1% chance that a random member of the fish-eating angler population is at or above this risk level). However, this conservative upper bound estimate of risk is still less than the majority of the risks associated with ingestion of locally caught fish calculated by CDM. Only risks calculated by CDM for the central tendency sport angler, using the *average* PCB tissue concentration, do not exceed this upper bound estimate of risk (risks calculated for the subsistence and high end sport angler exceed). Additionally, the risks calculated for this receptor (1.8×10^{-4} to 7.9×10^{-4} using the *average* concentration) are essentially equal to this upper bound risk, illustrating the overly conservative nature of point estimates. The results of the CDM and Cambridge HHRA for the fish ingestion pathway are summarized in the table below.

Risks Resulting from Fish Ingestion

Risk Assessment	100% Smallmouth Bass	75% Smallmouth Bass/25% Carp
CDM (Subsistence)*	$3.3 \times 10^{-3} - 7.9 \times 10^{-3}$	$6.0 \times 10^{-3} - 1.0 \times 10^{-2}$
CDM (Sport-Central Tendency)*	$5.8 \times 10^{-4} - 1.4 \times 10^{-3}$	$1.7 \times 10^{-4} - 1.8 \times 10^{-3}$
CDM (Sport-High End)*	$1.2 \times 10^{-3} - 2.8 \times 10^{-3}$	$2.1 \times 10^{-3} - 3.7 \times 10^{-3}$
Cambridge	Upper bound lifetime cancer risk for the 99 th percentile fish eating population (combined variable and uncertainty) = 2.0×10^{-4} Upper bound lifetime cancer risk for the average fish eating population = 5.0×10^{-5}	

*Range of values based on maximum concentrations reported in study areas.

As calculated by Cambridge, the population average intake of PCB for those who continually consume fish from the Kalamazoo River is $0.024 \mu\text{g/kg-day}$ (best estimate), which corresponds to an upper bound lifetime risk of 5.0×10^{-5} . Examining this data in terms of population risk, rather than individual risk, shows an upper bound estimate of about 0.0075 additional incidents of cancer per year among the continual eaters (based on the risks to those whose exposure started in 1999). Given the size and low additional risk in this population of fish eaters, and in light of a background cancer rate of approximately 60 per year, cancers attributable to consumption of locally-caught fish will not be observed.

3.3.2 Exposure to Former Impoundment Area Exposed Sediments

A key element of the risk assessment for the former impoundment areas is to estimate the PCB concentration in the exposed sediments to which a receptor may be exposed. Because receptors are not likely to be exposed only to areas within the former impoundment areas that are represented by the maximum detected PCB concentration, the "average (or the 95% UCL of the average) concentration is most representative of the concentration that would be contacted at a site over time" (USEPA, 1992a).

Cambridge adopted a more rigorous statistical approach for estimating exposure point concentrations than CDM, determining the specific data distributions prior to estimating the 95% upper confidence limit (UCL) of the mean. As a result, the 95% UCL exposed sediment PCB concentrations calculated in the Cambridge HHRAs are true conservative estimates of the actual site PCB mean concentrations (i.e. the true mean is expected to be lower than the 95% UCL estimate in approximately 95% of such evaluations).

The CDM and Cambridge HHRAs used different approaches to estimate exposure point concentrations for the former impoundment area. Although similar data sets were used, CDM reportedly calculated the 95% UCL around the mean for the floodplain data, but in all cases the reported 95% UCL was greater than the maximum PCB concentration in the exposed sediments. As a result, CDM used the average and single highest reported concentration as the exposure point concentrations. Actually, these 95% UCLs were calculated using the exposed sediment data from the former impoundment areas, without any consideration of the actual data distributions. Cambridge adopted a more rigorous statistical approach, determining the specific data distributions prior to calculating the 95% UCL. Cambridge also evaluated the data separately within and outside the former impoundments (the definition of inside and outside being based on historic water level elevations in the impoundments) because of the different physical situations and likely exposure regimes in and out of these areas. As a result, the 95% UCLs calculated by Cambridge more accurately reflect actual exposure conditions than do the maximum values assumed by CDM. The table below summarizes these lower exposure point concentrations used in each assessment (i.e., the 95% UCL of the mean versus maximum concentrations).

PCB Exposure Point Concentrations (mg/kg) Calculated for Exposed Sediments in the Former Impoundment Areas

Former Impoundment	Cambridge*	CDM
Plainwell	19.0 (avg); 36.0 (UCL)	10.9 (avg); 85 (max)
Otsego	14.0 (avg); 21.9 (UCL)	8.4 (avg); 36 (max)
Trowbridge	19.6 (avg); 29.3 (UCL)	12 (avg); 81 (max)

*Derived using maximum likelihood estimate.

3.3.3 Hunter/Fisher – Recreator

The hunter/angler recreator populations considered in the Cambridge and CDM HHRA are very similar and are expected to use the former impoundment areas in a similar manner. However, in addition to the different exposure point concentrations (maximum versus 95% UCL), differences in other assumptions used to assess exposure to PCB for these receptors were:

- The soil ingestion rate considered for CDM's recreator (100 milligrams per day [mg/day]) was twice that used for Cambridge's hunter/angler scenario (50 mg/day). Use of the 50 mg/day rate is an appropriate "reasonable central tendency estimate of adult soil ingestion and is the recommended value in [the Exposure Factors Handbook (USEPA, 1997)]."
- The CDM HHRA conservatively assumed the PCB bioavailability from soil is 100%. Cambridge used a relative bioavailability value of 76% as the fraction available from soil based on work by Fries et al. (1989). Assuming availability from soil of 100% fails to account for the significant effect that the soil matrix can have on the absorption of PCB from the gastrointestinal tract. Historically, USEPA has recommended values as low as 30% (USEPA, 1986). Hence, the use of 76% as supported by the work of Fries et al. (1989) is a conservative estimate of this parameter.
- CDM assumed the face, hands, and forearms of the receptor to be exposed, while Cambridge assumed the face, legs, feet, arms, and hands of the receptor to be exposed. Thus, the Cambridge assumption of dermal contact area is more conservative than the assumption used by CDM.
- CDM used a dermal absorption factor of 14% (as recommended by the USEPA in a review draft document - USEPA, 1998) based on work by Wester et al. (1993) in rhesus monkeys. There is a great deal of uncertainty associated with this value, including its relevance to conditions encountered in typical environmental exposure scenarios. Cambridge used 6%, a dermal absorption factor conservatively recommended for use by USEPA (1992b).
- CDM assumed the receptor is exposed 128 days per year, while Cambridge assumed 20 events per year. CDM's assumption was based on exposure 4 days a week for 32 weeks, and did not reflect Site-specific information on the behavior of hunters/anglers in the Kalamazoo River area. Cambridge's assumption was based on site-specific data describing actual hunting and fishing activities.

Comparison of the risks generated using the exposure assumptions for CDM's recreator and Cambridge's hunter/angler are presented in the table below. The values calculated using Cambridge's more realistic assumptions are substantially less (10 to 20 fold) than the risks derived in the CDM HHRA. The lifetime cancer risks calculated by Cambridge are below the MDEQ target risk level of 1 in a 100,000, and fall within acceptable risk range defined by the USEPA (1 in 10,000 to 1 in 1,000,000).

Risks Resulting from Exposure to Soil in the Impoundment Areas

Risk Assessment	Plainville	Ortogo	Frowbridge
Cambridge (hunter/fisher)*	2.8×10^{-6}	1.7×10^{-6}	2.3×10^{-6}
CDM (recreator)**	5.0×10^{-5}	2.1×10^{-5}	4.8×10^{-5}

* Values were calculated based on the lifetime risk reported in the draft Cambridge document. This value was based on an exposed sediment concentration of 100 mg/kg. To derive the risks presented the 95% UCL concentrations for each impoundment was substituted for the 100 mg/kg.

** Values based on maximum concentrations.

3.3.4 Trespassing Gardener and Resident

Two different populations were considered in the CDM and Cambridge HHRA's in an effort to address non-recreational use of the former impoundment areas. CDM's assumed the existence of residents living in the vicinity of the floodplain where daily contact with the exposed sediments would be expected. However, rather than using floodplain soil data, CDM used data from the former impoundments in the

assessment of risk, which represents a residential population that actually lives in the former impoundment areas. This exposure scenario is unrealistic. While residential populations may currently live nearby, future residential development of the former impoundment areas is highly unlikely, and the assumption of continual residential exposure to these areas is inappropriate. Cambridge's trespassing gardener was assumed to be a nearby resident using the area on a somewhat frequent basis for gardening activities, based on the observation of two such occurrences. In addition to the different exposure point concentrations, soil ingestion rates, dermal absorption rates, and bioavailability from as soil discussed above, the Cambridge HHRA did not consider a child receptor scenario as did the CDM (2000b) HHRA. The Cambridge HHRA also used different values for exposure frequency and exposure duration, as follows:

> The risks posed by exposure to exposed sediments found in the former impoundment areas as evaluated by Cambridge do not exceed the MDEQ acceptable risk level (1 in a 100,000) and fall within the USEPA acceptable levels (1 in 10,000 to 1 in 1,000,000).

- CDM assumed the receptor is exposed 350 days per year, while Cambridge assumed 100 events per year. The exposure frequency assumed by Cambridge was a conservative estimate based on current and reasonably expected future land use, while the CDM assumptions reflected a "worst-case" future residential scenario.

- CDM assumed a 30-year exposure duration, while Cambridge assumed an exposure duration of 20 years. This was a conservative assumption based on aerial photographs showing the presence of a garden at one location for a period as long as 10 years.

Comparison of the risks generated using the exposure assumptions for CDM's resident and Cambridge's gardening trespasser are presented in the table below. The values calculated using Cambridge's more realistic assumptions are substantially less (25 to 35 fold) than the risks derived in the CDM HHRA. The lifetime cancer risks calculated by Cambridge are below the MDEQ target risk level of 1 in a 100,000, and fall within acceptable risk range defined by the USEPA.

Risks Resulting from Exposure to Soil in the Impoundment Areas

Risk Assessment	Plainwell	Otsego	Trowbridge
Cambridge (trespassing gardener)*	9.7×10^{-6}	5.9×10^{-6}	7.9×10^{-6}
CDM (resident)**	3.8×10^{-4}	1.6×10^{-4}	3.6×10^{-4}

* Values were calculated based on the lifetime risk reported in the draft Cambridge document, which was based on an exposed sediment concentration of 100 mg/kg. To derive the risks presented the 95% UCL concentrations for each impoundment was substituted for the 100 mg/kg.

** Values based on maximum concentrations.

[In Cambridge's draft risk assessment, site-specific risks were not specifically calculated. Risks for the receptors exposed to the former impoundment areas were calculated based on a random soil concentration of 100 mg/kg - which was well above the 95% UCL concentrations derived for any individual former impoundment area.]

3.4 Modeling Analysis of PCB and Sediment Transport in the Kalamazoo River

This section summarizes the development of mathematical environmental models of river hydraulics, sediment transport, and PCB fate and transport in the stretch of the Kalamazoo River between Morrow Lake and Lake Allegan. These modeling tools for the Kalamazoo River were developed by Limno-Tech, Inc. (LTI), under the direction of Dr. Joseph DePinto, and are applied to support the detailed analysis of remedial alternatives that were developed in the FS Report (BBL, 2000b) for the Kalamazoo River. The principal component of the modeling tools is the Kalamazoo River PCB Simulation Model (KALSIM), which is designed to predict future concentrations of PCB in Kalamazoo River sediment and surface water taking into account ongoing natural attenuation processes and different remedial management scenarios. The KALSIM

> The Kalamazoo River PCB Simulation Model was used to predict future PCB concentrations in sediment and water and to evaluate different methods of reducing risks posed by PCB.

model presented herein is similar to mathematical models that have been used at other large-scale sediment sites for evaluation of remediation strategies. This model is similar in many respects, although significantly more advanced than, the model of the Kalamazoo River developed by the MDNR (NUS, 1986) to evaluate remedial alternatives for the Kalamazoo River. Most importantly, the model provides a quantitative framework to evaluate the projected relative effectiveness over time of the different remedial alternatives considered for the Kalamazoo River. The full modeling report and detailed supporting information are provided in Appendix S-8.

3.4.1 Modeling Objectives

The overall goal of the modeling effort is to develop and field-validate a scientifically credible model that quantitatively analyzes management alternatives for the river and, in particular, assesses the effectiveness of alternatives for reducing risks posed by PCB.

This section describes the development of the mathematical representation of the river and the processes governing the fate and transport of PCB under current conditions. This section also summarizes the development of the KALSIM model and projections of how PCB concentrations in sediment and surface water will change over time under the baseline assumption that no further action would be implemented at the Site. This "natural attenuation" projection serves as the reference case to which remedial alternatives developed in the FS Report (BBL, 2000b) are compared, and is included as Part I of Appendix S-8.

3.4.2 Model Overview

Sediment PCB fate and transport models are integrated mathematical descriptions of the natural physical, chemical, and biological processes that control the movement and biotic uptake of PCB in natural systems over time. Some of the more important natural processes affecting the movement and ultimate fate of PCB in sediment include: erosional forces that can move and resuspend sediments; deposition of "new" sediment on top of "old" sediment; physico-chemical and biotic-induced releases of PCB from sediment; mixing of surface sediment with deeper sediment; sorption processes; volatilization; and mechanisms of biotic uptake.

Over the past several decades, researchers have developed theoretical and empirical mathematical expressions to describe each of these processes as functions of independent variables that can be estimated or directly measured on a Site-specific basis. Based upon principles of mass balance, models integrate these mathematical expressions. Site-specific data and literature information are used to establish initial conditions, quantify loadings and other constraining

conditions, and parameterize the variables in the mathematical equations. The models are calibrated by adjusting specific parameters within scientifically defensible limits to achieve an overall best description of how PCB concentrations are changing in the system over time as a function of the external inputs. The success of model calibration is determined by how well the model estimates agree with existing site-specific multi-media data. A well-constrained and calibrated model provides a reasonable and confident quantitative description of the important processes, and an explanation of how and why conditions have changed in the past and present. Under the assumption that the underlying natural processes will continue in the future as they have in the past, the model is used to forecast future concentrations in the system over time. The model can then be used to simulate how active control and remedial measures affect the behavior of the system and to evaluate the relative effects and benefits of those actions.

3.4.3 Model Description

A suite of four modeling tools were developed to evaluate PCB and sediment fate and transport associated with implementation of the remedial alternative presented in the FS Report (BBL, 2000b):

Hydraulic and Sediment Transport Sub-model – River hydraulics and sediment transport were computed through application of the U.S. Army Corps of Engineers (USACE, 1993) HEC-6 model. The model provided information on sediment resuspension to the KALSIM model and was also used to determine the range of flow velocities that occur in the river and to assess sediment bed stability under high flow conditions. A calculation of sediment cap grain sizes capable of withstanding the 100-year flow condition was also performed with the HEC-6 model as part of this modeling analysis.

Wind Induced Wave Sub-model for Lake Allegan – Most of the PCB mass in the Kalamazoo River resides in Lake Allegan bottom sediments. In this relatively large and quiescent impoundment flow velocities are very low and flow induced resuspension will be negligible as demonstrated through a screening level analysis presented in the RI (BBL, 2000a). The predominant mechanism of sediment resuspension may be wind-waves. The USACE Automated Coastal Engineering System (ACES) wind-wave model was developed to calculate bottom shear stresses under high wind conditions to evaluate the potential for scour and resuspension of sediment in Lake Allegan in response to an extreme weather event.

Former Impoundment Bank Erosion Sub-Model – A simple mechanistic bank erosion model that provides an estimate of the rate of bank erosion in the state-owned former impoundments was developed and calibrated. Based upon data and observations collected to date, it is estimated that the banks in the former impoundments are presently the most

significant external source of PCB to the sediment and water column of the Kalamazoo River. The submodel was based upon work by Osman and Thorne (1988), and calibrated to survey data collected in 1993 and 1999 which measured the change in geometry at numerous transects in the former impoundments.

PCB Fate and Transport Model - The primary modeling tool developed for the Kalamazoo River is a dynamic sediment and water quality mass balance model (KALSIM) that uses a modified Water Quality Analysis Simulation Program (WASP) framework (Ambrose et al., 1993). WASP is a USEPA-supported model that has been widely applied for assessing PCB fate and transport in similar rivers. The model has been constructed in 35 segments to represent the Kalamazoo River from the inlet to Morrow Lake to the outfall from Lake Allegan (see Figures 2-1a and 2-1b of Appendix S-8). The model uses site-specific data, literature information on natural process variables, and results from the hydraulic and sediment transport model to calculate the fate and transport of total PCB in the Kalamazoo River sediment and water column over time. The model calculates dynamic mass balances first for water and sediment, and then for total PCB in both media.

3.4.4 Model Calibration

Site-specific data (collected largely as part of the RI) were used to establish the model geometry and segmentation, flow history, loading source locations, and loading history for both solids and PCB, and to establish initial conditions for PCB distribution in sediment. Once the model inputs were specified, the remaining internal model parameters were calibrated so that model outputs (e.g., water column solids and PCB concentrations) agreed with field observations. The model was calibrated over a multi-year period, from 1993 to 1999, to the extent that data were available, so that it adequately characterizes not only short-term fluctuations in concentrations caused by hydrologic and seasonal conditions, but also important long-term trends. Rates of decline in fish tissue PCB data were used as a surrogate for surface sediment PCB attenuation rates in the KALSIM calibration. The KALSIM model was used to further support the conclusions reached in the RI/FS that remedial alternatives for the Site must be considered on a river-wide basis to provide the greatest effectiveness in attaining remedial response objectives (RROs).

Overall, calibration of the KALSIM model was successful in representing the hydraulics, sediment transport, and total PCB transport and fate in the Kalamazoo River over the historical calibration period. Results of the short-term and long-term calibrations are in good agreement with the magnitudes and trends of the Site-specific data. In addition to the predictive capabilities gained through successful calibration, the model also serves as a powerful data interpretation tool because it integrates the different media and PCB distributions over time, and provides insight into processes governing PCB behavior in the river. When data have been collected for one media or process, the model can be used to

quantitatively assist in the analysis of observations for other inter-related media or processes. This cannot be done with discrete data alone. As a simple illustration, if a particular reach of the river is relatively slow moving, the model would identify and quantify expectations for data observations for other media and processes that would be consistent with this measurement, such as:

- Geometry and slope consistent with relatively slow movement;
- Accumulation of sediment in the reach;
- Relatively fine-grained sediment in the sediment bed;
- Higher suspended solids concentrations and perhaps higher PCB concentrations in the water column upstream of the reach than downstream;
- Relatively new sediment overlying older sediment;
- Lower concentrations of PCB in the surface sediment than in deeper sediment;
- Higher PCB mass per unit area in the sediment than in fast moving reaches;
- Reductions in PCB load gains across the reach over time; and
- Little relationship between flow and PCB load gain across the reach.

Independent corroboration for any of these observations, help confirm the reliability of the independent data and also confirm the parameterization of the model. Conversely, this process could be used to identify other considerations, anomalies, or the need to refine the model calibration.

3.4.5 Continuing Model Development

The model that has been developed and calibrated for use in this report provides a reasonable representation of the Kalamazoo River system. Additional data collection efforts are underway (described in Section 2) that will support refinement and further development of the model to allow more precise evaluation of the effectiveness of different remedial alternatives for the river.

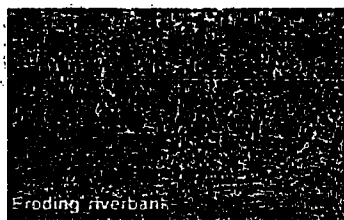
Inside Section 1 - Introduction

Inside Section 2 - Additional Site Characterization

Inside Section 3 - Updated Site Assessment

Inside Section 4 - Evaluation & Comparison of Remedial Alternatives

★ **Results from the nine supplemental studies and runs of the KALSIM model support the selection of bank stabilization at the former impoundments and monitored natural attenuation as the optimal choice for the Kalamazoo River.**



Eroding riverbank



Stabilized riverbank

The eroding riverbanks in the former impoundments (above left) are the largest ongoing source of PCB to the Kalamazoo River. Modeling evaluations, discussed in this section, show that through bank stabilization this source of PCB can be effectively mitigated and risks reduced to acceptable levels.

What is KALSIM?

The Kalamazoo River PCB Simulation Model, or KALSIM, is a mathematical computer model that was developed to predict future concentrations of PCB in surface water and sediments after implementation of each active remedial alternative evaluated in the Feasibility Study. The reductions in PCB concentrations due to implementation of bank stabilization, river-wide capping, and river-wide dredging were compared to each other and to the reductions achieved by natural processes alone.

Why were all the alternatives compared to the reductions achieved through natural attenuation?

Natural attenuation processes at work in the Kalamazoo River - most importantly burial and mixing of PCB-containing sediments with cleaner materials - are constants that are expected to continue indefinitely, whether or not any remedial action is implemented. The predicted benefits of each remedial alternative were compared to the benefits of natural attenuation to be certain that any further remedial actions would be more effective in reducing risks than natural attenuation alone.

How are the KALSIM results interpreted?

The model predicts changes in future concentrations of PCB in river sediment, which are expected to result in proportional changes in concentrations of PCB in fish tissue. As discussed in the RI Report, consumption of fish by humans and wildlife is the primary exposure pathway. The model can help assess the relative performance of each remedial alternative in reducing PCB in sediment and, therefore, fish in efforts to reduce potential risks to human health and the environment.

4. Evaluation and Comparison of Remedial Alternatives

This section brings together the information collected during the additional Site investigations and the results of the KALSIM model to further refine and support the evaluation of remedial alternatives that was presented in the FS Report (BBL, 2000b). Four critical elements are discussed: 1) the effectiveness and permanence of natural attenuation as an active process at the Site in reducing PCB concentrations in surficial sediments, as shown by the various components that comprise the KALSIM model; 2) quantitative support for the substantial reductions in PCB loads that can occur through stabilization of the banks in the former impoundments; 3) verification of the presence of substantial obstacles that make river-wide dredging or capping difficult to implement and would significantly reduce effectiveness of these measures; and 4) quantitative evidence showing that the incremental benefits of river-wide dredging are quite small when compared to the benefits of natural attenuation and bank stabilization.

Section Summary

This section integrates the results of the RI/FS and additional studies with application of the KALSIM fate and transport model to provide a supplemental evaluation of the five remedial alternatives considered in the feasibility study.

Specifically, forecasts from the KALSIM model and results of several physical and analytical studies are used to further refine the evaluation of the three active alternatives evaluated in the feasibility study. Alternative 3 = former impoundment riverbank stabilization and natural attenuation. Alternative 4 = river-wide capping of submerged sediments and Alternative 5 = river-wide dredging of submerged sediments.

Using the NCP criteria, the relative benefits and impacts of each alternative are discussed beyond what is presented in the feasibility study. Thus, the additional data and KALSIM forecasts are used to refine and extend the evaluation of alternatives and predict the effectiveness of each alternative relative to natural attenuation.

The various KALSIM model simulations show that the natural attenuation processes of redistribution and burial in Lake Allegan are projected to provide a permanent, sustainable reduction in surficial sediment PCB concentrations. The wind-wave resuspension modeling, using USACE protocols, shows that wind-driven waves (potentially the greatest source of resuspension in Lake Allegan) are very unlikely to upset the natural attenuation processes. The modeling efforts further demonstrate that PCB loads from the banks in the former impoundments can be controlled through bank stabilization. The banks were shown both in the RI Report (BBL, 2000a) and data presented in this Supplement to be the largest remaining external source to the Site. Modeling provides quantitative evidence that controlling the bank sources would reduce surficial sediment PCB concentrations more quickly than river-wide dredging or capping alternatives. The modeling results show that the incremental benefits of river-wide dredging are questionable when compared to natural attenuation, and would have a tremendous negative impact on the ecosystem over a period of 25 years.

Concerns about the presence of debris in sediments throughout the Site that would seriously complicate sediment removal, as discussed in the FS Report (BBL, 2000b), were confirmed through a diver-reconnaissance survey of the bottom of Lake Allegan and by taking spot-counts of tree growth throughout the banks of the river. These surveys show that implementation of dredging or capping on a river-wide basis would be an extremely difficult, expensive, and time-consuming process. Substantial clearing of bottom debris would be required prior to dredging or capping large portions of the Site. Site preparation, through the construction of access roads and staging areas along the banks, would require destruction of thousands of trees and some sensitive habitats, causing substantial and, in some cases, irreparable ecological damage.

4.1 Model Forecasts

The RI Report (BBL, 2000a) (Section 7) and FS Report (BBL, 2000b) (Section 2.5) describe the general approach that was used to conceptualize a potentially effective spatial application of engineered remedial alternatives. This was based on simple mass-balance calculations and consideration of PCB inventories in the bed and water column of the Kalamazoo River. Site data and results of system analyses were evaluated to assess whether there are opportunities to significantly reduce potential human exposure to PCB by concentrating remedial efforts within a relatively small portion of the Site. Effectiveness is viewed primarily as the degree of reduced risks and corresponding residual risk level achieved by reducing surface sediment and, consequently, fish PCB concentrations. The KALSIM model was used to further support the hypothesis that engineered alternatives are appropriately conceptualized as being most effective when applied from upstream to downstream, and addressing the entire sediment bed within the Site, as discussed below.

The principal component of the RI/FS suite of models is the KALSIM model, which is designed to predict future concentrations of PCB in Kalamazoo River sediment and water under the natural attenuation course of the system and

other sediment management scenarios. The KALSIM model is similar to mathematical models that have been used at other large-scale sediment sites for the evaluation of remediation or management strategies. Most notably, although significantly more advanced, this model is similar in many respects to the model developed by the MDNR (NUS, 1986) to evaluate remedial alternatives for the Kalamazoo River. The model provides a quantitative framework for the evaluation of the projected relative effectiveness over time of the different remedial alternatives considered in the FS Report (BBL, 2000b).

➤ The Kalamazoo River PCB Simulation Model was used to predict future PCB concentrations in sediment and water and to evaluate different methods of reducing risks posed by PCB.

The KALSIM model provides further support for the conclusions reached in the RI/FS that remedial alternatives for the Site must be considered on a river-wide basis to provide the greatest effectiveness in attaining RROs. As discussed in Section 2.5 of the FS Report (BBL, 2000b), the relative effectiveness of actively remediating (e.g., capping, dredging) sediment PCB in any discrete area of the river in reducing future fish PCB concentrations can be found in the answer to three questions:

- To what extent will PCB levels currently in a particular reach of the river sustain PCB concentrations in fish in and around that area in the future?
- To what extent will future transport from a particular reach affect PCB concentrations in fish found in downstream areas in the future?
- To what extent will fish PCB concentrations in a particular reach be sustained in the future by PCB transport from upstream areas (versus PCB already in the area)?

The KALSIM model was used to provide answers to these questions based on simplified simulations of remedial scenarios, as discussed below.

The maximum hypothetical benefit to downstream reaches from the remediation of any individual reach between Morrow Lake and Lake Allegan was evaluated using the KALSIM model to simulate hypothetical instant-and-complete remediation only of specific reaches of the Kalamazoo River to produce future PCB concentrations in sediment throughout the Site. This was accomplished assuming that remediation of the channel and bank sediments was 100 percent effective in reducing sediment PCB concentrations to zero. Although this assumption is unrealistic, the simulation results provide an indication of the maximum benefit theoretically attainable.

The model predicted: 1) relatively small changes in downstream surface sediment PCB concentrations in response to the hypothetical elimination of PCB through remediation of channel sediments in any particular section; and 2) substantially larger responses to remediation of the exposed sediment banks. Remediation of channel sediments in any particular river section did not provide significant additional reductions in surface sediment PCB levels in downstream reaches after 30 years over natural attenuation processes alone – average additional reductions in downstream reaches were all less than 10 percent. In contrast, remediation of the exposed banks was more effective to downstream reaches than remediation of channel sediments.

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As summarized in the following table, stabilization of the former Plainwell Impoundment banks appeared to have the greatest impact relative to natural attenuation. In addition to reducing PCB concentrations by 66 percent in the former Plainwell Impoundment sediments at Year 30, surface sediment PCB concentrations were reduced by 29 percent in the Otsego City Impoundment, 39 percent for the Allegan City Impoundment, and 17 percent in Lake Allegan relative to natural recovery alone. The effects of stabilizing the other former impoundment banks were not as great due to their diminishing loads to the river in the future.

**PERCENT REDUCTION IN ANNUAL AVERAGE SURFACE SEDIMENT PCB CONCENTRATIONS
FOR REMEDIATION IN INDIVIDUAL REACHES RELATIVE TO NATURAL ATTENUATION AFTER 30 YEARS
ASSUMING INSTANTANEOUS, COMPLETE REMEDIATION IN YEAR 2000**

Bank Deposit Remediated	Percent Reduction Relative to Annual Average Natural Attenuation Concentration (in 2020)						
	Former Plainwell Impoundment	Otsego City Impoundment	Former Otsego Impoundment	Former Trowbridge Impoundment	Trowbridge to Allegan Dam City Limit	Allegan City Impoundment	Lake Allegan
Former Plainwell Bank Stabilization	66%	29%	8.9%	22%	9.0%	39%	17%
Former Otsego Bank Stabilization	—	—	18%	9.6%	3.7%	17%	7.3%
Former Trowbridge Bank Stabilization	—	—	—	14%	4.0%	17%	7.4%

— Not Applicable

A second series of KALSIM simulations was conducted to assess the response to sequentially eliminating PCB from successive reaches of the Site and the banks of the former impoundments. For this series of simulations, sediment PCB concentrations for a particular reach and all upstream reaches were set to zero to represent an instantaneous and simultaneous remediation. Consistent with the results of the individual reach simulations described above, the greatest reductions in sediment PCB concentrations relative to natural attenuation would be achieved through elimination of former impoundment PCB sources. In addition, major (i.e., greater than 90 percent) additional reductions relative to natural attenuation in any reach are only achieved through a comprehensive "bank-to-bank" elimination of PCB from successive reaches of the river bed. The elimination of all river bed and riverbank sources upstream of Lake Allegan would achieve a reduction of only 52% in surficial sediment PCB concentrations relative to natural attenuation.

In conclusion, system modeling of very conservative, simplified remedial scenarios predicts:

- The elimination of PCB loading from the riverbanks of the MDNR-owned former impoundments results in the greatest reductions in downstream surficial sediment PCB concentrations relative to natural attenuation; and

- Both PCB transport from upstream sources and residual PCB following sediment removal are important sources of future PCB in surficial sediment in each reach.

If remedial alternatives that involve sediment dredging or capping were selected, these conclusions would support performing comprehensive bank-to-bank sediment removal in an upstream to downstream direction.

4.2 Application of the KALSIM Fate and Transport Model for the Kalamazoo River

This section provides an overview of the application of the KALSIM PCB fate and transport model. The KALSIM model results are used to quantitatively assess the expected performance of different remedial alternatives with respect to several of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP-40 CFR 300.430) evaluation criteria, including:

Overall Protection of Human Health and the Environment - The model results are used to quantitatively assess the reductions of PCB concentrations in bioavailable sediment and surface water over time, achieved by each alternative relative to current conditions. The relative reductions in these exposure concentrations translate directly to reduction in human health and ecological risk over time for each alternative.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - The model is used to estimate the likelihood that each alternative would comply with the MDEQ surface water quality criterion for PCB.

Long Term Effectiveness - The model results are used to quantitatively assess relative reductions in future residual exposure concentrations achieved by each alternative relative to current conditions. In addition, the model results are used to assess the permanence of the natural attenuation and capping alternatives by evaluating the potential for re-exposure of buried or capped sediments due to extreme natural events.

Short-Term Effectiveness - The model is used to quantitatively assess environmental impacts that are likely to occur during the implementation of the remedial alternatives.

4.2.1 General Modeling Approach

Taking into consideration the current conditions and important processes that affect the fate and transport of PCB in the Kalamazoo River (as discussed above), the model was used to project future conditions and concentrations in the water column and sediments for each remedial alternative developed in the FS Report (BBL, 2000b). To project future PCB concentrations under the "no further action" alternative, the model has been run for the period of 2000 to 2040 under the assumption that environmental processes will continue to function in the future as they have functioned over the calibration period. The "no further action" model scenario served as the reference case to which the modeling results of the other alternatives were compared. To simulate remedial actions, conditions and processes in the model were changed to reflect changes that would occur because of active remediation. For example, to simulate dredging scenarios or capping alternatives, sediment concentrations in a model reach were projected based on model input parameters that included reduction of PCB concentrations in Site media corresponding to the actual benefits of the removal or capping of those sediments. All other processes were assumed to remain the same as in the "no further action" case. The model projected the resulting sediment concentrations in the remediated reach, as well as downstream reaches over time, in response to such actions.

Modeled Scenarios

As discussed in greater detail in Appendix S-8, the alternatives that were retained for detailed analysis in the FS Report (BBL, 2000b) were simulated with the model to generate a 40-year forecast. These alternatives include:

Alternative 1: No Further Action

Alternative 2: Institutional Controls and Monitoring

Alternative 3: Bank Stabilization at the Former Impoundments, Monitored Natural Attenuation, and Institutional Controls

Alternative 4: River-Wide Containment of Submerged Sediments, Bank Stabilization at the Former Impoundments, Institutional Controls, and Monitoring

Alternative 5: River-Wide Dredging of Submerged Sediments with Upland Confined Disposal, Bank Stabilization at the Former Impoundments, Institutional Controls, and Monitoring

Since the conditions simulated under Alternatives 1 and 2 (i.e., no active remediation) were the same, only one model simulation run was performed to evaluate these two alternatives.

4.2.2 Scenario Representation and Assumptions

The relative projected performance of an alternative in reducing exposure concentrations over time was highly dependent upon assumptions used in the model forecasts. The key assumptions that were used include: 1) the time when remediation of a particular reach began; 2) construction sequencing and duration; 3) amount of sediment and associated PCB released to the environment during the implementation of the remedial action; and 4) the residual concentration of PCB in the surface sediment following completion of the remedial action. Model inputs for these assumptions were developed in the FS Report (BBL, 2000b) using documented results from the implementation of remedial actions at other contaminated sediment sites. These inputs reflected realistic implementation schedules and residual PCB concentrations.

Key assumptions affecting the KALSIM model simulation outcomes concerned the following model parameters:

- The time when remediation of a particular reach begins
- The construction sequencing and duration
- The amount of sediment and PCB released to the environment while performing the remedial action
- The residual concentration of PCB in the surface sediment following the completion of remedial activities

A degree of uncertainty may be associated with other specific model assumptions either because they required assumptions of future environmental conditions or due to data limitations and data variability. (Examples of these assumptions include: future hydrology; future upstream concentrations; and other ecological factors involved in regulating the extent of PCB bioaccumulation that may change over time). Although these assumptions may affect the absolute results, they are not likely to affect the projections for all alternatives similarly because the assumptions are the same for all alternatives. The relative uncertainty of the model in predicting specific PCB concentrations for a specific point in time is higher than the uncertainty of predicting the relative effectiveness of different remedial alternatives, for which the model yields credible results. In this manner, the model is an appropriate tool for comparing the relative performance of various potential remedial alternatives.

4.2.3 Model Forecasts

Each alternative was simulated for a 40-year duration by adjusting sediment concentrations in each reach to estimated post-remediation residual levels according to the estimated implementation schedule. For example, for the dredging scenarios, the modeled sediment concentrations for a given reach were reduced to estimated post-dredging concentrations in the projected year that dredging would be completed for that reach. In addition, the model inputs for a particular reach were adjusted so that PCB loads reflecting expected releases during dredging for that reach were included in the

simulation. Output from the model includes projected PCB sediment and water column concentrations, and PCB mass exported from Lake Allegan for each alternative over the 40-year forecast period.

Hydraulic and sediment transport modeling was conducted to evaluate the stability of sediment left in place and to determine cap stability under extreme events. KALSIM model runs were conducted to evaluate shear stresses and erosion potential for a 100-year flood event. For Lake Allegan, a wind-induced wave model was developed and applied to evaluate the erosion potential associated with a 1-in-100 year windstorm. The results of both models indicate that erosion of sediment during these extreme events would be expected to be minimal. The findings of the model forecasts are described below:

1. *Natural attenuation is projected to continue reducing PCB exposure concentrations throughout the river for the next 40 years and beyond.* Over the 40-year forecast period, natural attenuation is predicted to reduce surface sediment PCB concentrations by 80% to 97% compared to 1993-97 average concentrations¹ in all reaches except for the former Plainwell and Otsego impoundments. Continued erosion of PCB-containing banks in the MDNR-owned former impoundments gradually affects the rate of reductions in these reaches, which have projected reductions of 58% and 81%, respectively, over the forecast period.
2. *Natural attenuation is occurring at similar rates in depositional and non-depositional areas.* In the relatively fast flowing reaches such as the reach between Morrow Lake and Plainwell, natural attenuation is occurring largely due to replacement, mixing, and dilution of the surface sediments. In the depositional reaches such as the Allegan City Impoundment and Lake Allegan, natural attenuation is occurring largely due to continuing mixing, deposition, and burial by cleaner sediments.
3. *If remediation were implemented only in limited areas, recontamination from PCB upstream would occur, especially in the impoundments.* For example, the model shows that even if all PCB could be removed instantly from Lake Allegan today, by 2030 surface sediment PCB concentrations in the lake would increase due to contributions from upstream sources to more than half (57%) of what they would have been if natural attenuation processes continued alone. These results are conservative in that they

¹ Percent reductions are compared to the 1993-97 average model-computed surface sediment concentrations because average fish concentrations from this period were used by CDM in assessing human health risks for the MDEQ. The percent reduction in the 1993-97 average model result provides an indication of expected reductions in health risks associated with fish consumption because fish derive much of their PCB body burdens through exposure to surface sediments through a benthic food pathway.

represent idealized remediation to PCB concentrations of zero, and do not account for the many years it would take to dredge the lake or post-dredging residual PCB concentrations that would remain.

4. *Targeted sediment removal or capping only in specific reaches or various combinations of several reaches will not result in major reductions in Site-wide average or downstream exposure concentrations compared to bank stabilization and natural attenuation.* This is largely because of the widespread distribution of PCB in the sediment throughout the river, and lack of discrete "hot spots" that have large disproportionate contributions to Site-wide average exposure concentrations or downstream transport. Mitigating bank erosion in the former impoundments is projected to have the greatest effect. Hypothetical removal or capping of any single reach is projected to reduce average Site-wide concentrations by only 1% to 12% relative to natural attenuation. In contrast, hypothetical bank stabilization in individual former impoundments is projected to reduce Site-wide average concentrations by up to an additional 19% relative to natural recovery. Similarly, hypothetical removal or capping of submerged sediment in any reach upstream of Lake Allegan is projected to reduce concentrations in Lake Allegan sediment by less than 5% relative to natural recovery, whereas hypothetical bank stabilization in individual former impoundments is projected to result in reductions of up to 17% in Lake Allegan sediment relative to natural recovery.
5. *With bank stabilization, which would eliminate the largest continuing external source of PCB to the river, surface sediment PCB concentrations are reduced by at least 80% in all reaches by natural attenuation processes by the year 2040.* With the exception of the reach between Trowbridge Dam and Allegan City Dam², all areas outside of the former impoundments are projected to show large declines in surface sediment PCB concentrations of 93% to 97% in 40 years.
6. *Only marginal additional reductions in surface sediment PCB concentrations are expected by 2040 compared to bank stabilization, even under the optimistic assumptions³ of dredging efficiency and implementation schedules used in forecasting river-wide dredging effectiveness.* Bank stabilization leads to declines of 93% to 97% in surface sediment PCB concentrations for all reaches outside of the

² For the reach between Trowbridge Dam and Allegan City Dam, a somewhat lower decline of 83% is projected under bank stabilization, however the projected average surface sediment concentrations at the end of the forecast period are as low as the other reaches (less than 0.1 mg/kg).

³ Post-dredging PCB concentration equals 24% of pre-dredging surface sediment PCB concentration and during dredging sediment release rate equals 0.10 kilogram per second.

former impoundments, except for Trowbridge Dam to Allegan City Dam, which shows a decline of 83%.

By comparison, river-wide dredging is projected to further reduce exposure concentrations by only 2% to 3% relative to bank stabilization in the same amount of time. This estimate is based upon an optimistic assumption regarding the efficiency of the dredging operations; actual reductions may be less.

7. ***Remediation of reaches other than the former impoundments is projected to provide only marginal reductions in exposure concentrations relative to reductions predicted for natural attenuation in those reaches.*** As a corollary to conclusions 5 and 6, natural attenuation in reaches other than the former impoundments will provide almost the same reduction in exposure concentrations as active remediation.
8. ***Even the most aggressive remedial alternatives have practical limitations on ultimate effectiveness.*** For example, even river-wide dredging or capping will not achieve Michigan water quality criteria for PCB over the 40-year forecast period: concentrations would exceed the criterion by tenfold. This is largely due to very small but continuing background loads, loads from Morrow Lake, and practical limitations of remediation efficiencies. Another practical limitation is the amount of time required to implement Site-wide remediation, during which natural attenuation processes would have achieved significant reductions, and decrease the overall benefit of active remediation.
9. ***The occurrence of a 100-year flood will not disrupt the natural attenuation course of the river.*** Simulation results from a realistic 100-year return frequency flow event at the beginning and 30 years into the 40-year forecast period showed no appreciable disruption of declines in surface sediment PCB concentrations due to natural attenuation. These results show that natural attenuation will produce sustainable reductions in PCB exposure, and disruption of natural attenuation due to high-flow events is unlikely to occur.
10. ***Waves from a 100-year windstorm in Lake Allegan will not result in remobilization of buried sediment with higher PCB concentrations.*** Estimated bottom shear stresses in Lake Allegan from a wind wave model for a 100-year wind storm are below typical critical resuspension shear stresses reported in the peer-reviewed literature for fine sediments in similar environments. A 100-year wind condition is unlikely to cause significant resuspension in the lake and critical shear stress exceedence is limited to small near-shore areas. This finding is consistent with the long depositional record observed in radionuclide-dated sediment cores collected in the lake.

11. *Extreme natural events are unlikely to disrupt natural attenuation in Lake Allegan.* Based on the 100-year flow event simulation with KALSIM and 100-year wind analyses with the Lake Allegan wind-wave model, Lake Allegan sediments appear stable and unlikely to experience resuspending conditions over most of the lake under extreme flow or wind conditions. Lake Allegan is projected to continue to bury surface sediment PCB with cleaner sediment with little chance of remobilization due to flow or wind-related resuspension.

4.3 Overall Protection of Human Health and the Environment

As discussed in Section 5.2 of the FS Report (BBL, 2000b), the evaluation and comparison of remedial alternatives is based, in part, on the degree to which each alternative achieves the RROs established for the Site. This section describes how the KALSIM model is used to quantify the achievement of RROs.

The degree of reduction in surface sediment PCB concentrations achieved by a given remedial alternative is a measure of the effectiveness of that alternative in protecting human health and the environment. The primary exposure pathway related to PCB in sediments and the water column is through the consumption of fish that have bioaccumulated PCB.

Therefore, the primary RRO for the Site is the reduction of fish tissue PCB concentrations. Projected fish tissue concentrations have not been explicitly modeled, as the bioaccumulation forecasting calculation/model is still under development. However, based upon RI and supplemental investigations conducted to date, future projected changes over time in surface sediment and water column PCB concentrations due to natural processes or active remediation are expected to result in proportional changes in fish tissue PCB concentrations. Thus, the model projections for PCB concentrations in surface sediments and water illustrate the relative effectiveness of different remedial alternatives in reducing fish tissue concentrations and therefore, a relative indication of reductions in human health and ecological risks.

The relative reductions in surface sediment PCB concentrations achieved by each alternative are calculated for two exposure periods consistent with assumptions used in the exposure assessment conducted by CDM for the MDEQ (CDM, 2000b):

- 39-year average PCB concentrations for the period 2000-2039 were calculated to represent exposure concentrations relevant to human cancer risk estimates. These average concentrations were compared with the average concentrations between 1993 and 1997 (assumed to remain constant for 39 years) to determine relative reductions in exposure projected over the next 40 years; and

- 2-year average PCB concentrations were calculated for the period 2039-2040 to represent post-remediation exposure concentrations relevant to ecological risk estimates and human health reproductive risk estimates. These average concentrations were compared with the average concentrations between 1993 and 1997 to determine relative reductions in short-term exposure following completion of remediation.

The percent reduction in surface sediment concentrations is used to infer relative percent risk reduction. Risk calculations are a linear function of exposure concentrations, so the percent reduction in exposure translates directly to percent reduction in risk.

Results for these analyses are depicted in the tables presented below. As seen in the first of these tables, there is little difference (<10%) between alternatives in the projected reduction in the 39-year average surface sediment concentrations in all reaches except the former impoundments. In the two reaches between Morrow Lake and Plainwell, natural attenuation is projected to achieve a reduction of 83% to 85% in the 39-year average. In comparison, river-wide dredging is projected to achieve a reduction of 84% to 91%, and capping achieves a reduction of 91% to 92%. In the Otsego City Impoundment, natural attenuation achieves a projected reduction of 78%, compared with 80% for bank stabilization, 78% to 87% for dredging, and 87% for capping, respectively. In Allegan City Impoundment and Lake Allegan, natural attenuation is projected to reduce the 39-year average surface sediment concentrations by 81% and 74%, respectively. Bank stabilization in the former impoundments is projected to provide an additional reduction of 3% to 5% in each of the downstream impoundments, which is essentially the same as the additional reduction projected to result from river-wide dredging or capping.

Percent Reduction in 39-year (2000-2039) Average Surface Sediment PCB Concentrations Relative to the 1993/1997 Average Model-computed Concentrations

Reach	Natural Attenuation	Bank Stabilization	Riverwide Dredging	Riverwide Capping
Morrow Lake	70.3	70.3	70.3	70.3
Morrow Lake to Portage Creek	84.7	84.7	84.3 - 90.6	92.4
Portage Creek to Main Street Plainwell	82.6	82.6	84.6 - 88.8	91.3
Former Plainwell Impoundment	45.9	63.5	54.5 - 71.9	81.2
Otsego City Impoundment	77.6	80.3	78.3 - 87.3	87.0
Former Otsego Impoundment	64.4	68.9	72.1 - 84.4	83.3
Former Trowbridge Impoundment	76.3	80.1	78.6 - 83.9	83.6
Trowbridge to Allegan City Limit	65.0	68.0	66.9 - 75.9	76.8
Allegan City Impoundment	81.0	87.3	83.2 - 86.1	87.5
Lake Allegan	73.9	76.3	72.6 - 80.3	77.0
Site-wide Average ²	72.2	76.2	74.5 - 81.9	83.0

**Percent Reduction in 2-year (2039-2040) Average Surface Sediment PCB
Concentrations Relative to the 1993/1997 Average Model-computed Concentrations**

Reach	Natural Attenuation	Bank Stabilization	Riverwide Dredging	Riverwide Capping
Morrow Lake	93.7	93.7	93.7	93.7
Morrow Lake to Portage Creek	97.0	97.0	97.6 - 99.4	99.3
Portage Creek to Main Street Plainwell	93.4	93.4	98.3 - 99.7	99.6
Former Plainwell Impoundment	55.2	80.2	82.4 - 99.4	99.6
Otsego City Impoundment	91.3	94.9	96.4 - 99.5	99.5
Former Otsego Impoundment	76.4	79.0	93.6 - 99.8	99.9
Former Trowbridge Impoundment	91.6	95.9	97.1 - 99.8	99.8
Trowbridge to Allegan City Limit	80.2	83.7	91.0 - 99.6	99.8
Allegan City Impoundment	91.1	96.8	97.9 - 99.7	99.7
Lake Allegan	91.5	94.6	93.8 - 99.6	98.6
Site-wide Average ²	86.1	90.9	94.2 - 99.0	98.9

¹Upper and lower values in ranges represent percent reductions achieved assuming maximum and minimum residual surface sediment concentrations, respectively.

²Includes Morrow Lake; average based on equal weighting for all reaches.

In the former impoundments, natural attenuation is projected to reduce the 39-year average surface sediment PCB concentration by 46% to 76%. In comparison, bank stabilization is projected to achieve 63% to 80% reductions, river-wide dredging is projected to achieve 55% to 84% reductions, and river-wide capping is projected to achieve 81% to 84% reductions.

The second table shows the projected percent reductions in the 2-year average surface sediment PCB concentrations at the end of the forecast period (2039-2040) vs. the average of the 1993-1997 period. This averaging period is intended to reflect exposure estimates pertinent to ecological risks and human health reproductive effects after the active alternatives have been substantially completed. As can be seen in this table, the results suggest similar conclusions to those for the 39-year average concentration results. There are only slight differences in the projected percent reductions achieved by active alternatives over natural attenuation in all reaches except the former Plainwell and Otsego impoundments. Natural attenuation is projected to achieve approximately 91% reductions in the 2-year average concentrations in the former Trowbridge Impoundment and all existing impoundments (Morrow Lake, Otsego City, Allegan City, and Lake Allegan), and a 93% to 97% reduction in the reaches between Morrow Lake and Plainwell. In comparison, river-wide dredging is projected to achieve 94% to 99% reductions in these reaches, and river-wide capping is projected to achieve a reduction of greater than 99%. For the reach between Trowbridge Dam and Allegan City Dam, natural attenuation is projected to achieve a reduction of 80%, but the concentrations in this reach are initially relatively low (0.55 mg/kg), and are projected to be similar to the other reaches at the end of the forecast. River-wide dredging is projected to achieve 91% to 99% reductions in this reach, and capping is projected to achieve a reduction of greater than 99%.

In the former Plainwell and Otsego impoundments, natural attenuation is projected to reduce the 2-year average surface sediment PCB concentrations by 55% to 76%. Bank stabilization is projected to reduce the concentrations in these impoundments by 79% to 80%, and capping is projected to result in reductions greater than 99%. River-wide dredging is projected to result in 82% to 99% reductions. In addition to reducing concentrations in these impoundments, bank stabilization is projected to reduce the average concentrations in the downstream existing impoundments and the former Trowbridge Impoundment by an additional 3% to 5%.

The ancillary RROs for the Site focus on the reduction of water-column transport of particle-bound PCB to Lake Michigan and PCB loading to the river. The projected annual average PCB load transported over Lake Allegan Dam to the lower Kalamazoo River for each remedial alternative are shown in Appendix S-8, Figure 4-2. Appendix S-8, Figure 4-3 shows the cumulative load over the modeled period. As demonstrated in the figures, due to natural attenuation processes, the annual loads are projected to continue to decline throughout the forecast period under natural attenuation, achieving a 90% reduction over the modeled period. The bank stabilization, dredging and capping scenarios are projected to result in lower annual loads by the end of forecast, achieving 98% to 99% reductions. In terms of reducing cumulative loads over the period, bank stabilization is projected to be more effective than dredging and as effective as the capping scenario. Bank stabilization and capping are estimated to reduce the cumulative load over Lake Allegan Dam by 20% over the forecast period, whereas dredging is calculated to reduce the load by 10%. The differences are attributable to differences in when the most important sources to downstream transport (banks in the former impoundments) are mitigated and the additional releases to the water column estimated to be caused by dredging operations.

Appendix S-8, Figures 4-4a, 4-4b, and 4-4c show the model forecasts for the annual average PCB concentrations in the water column at the former Plainwell and Trowbridge impoundments, and Lake Allegan, respectively. Similar to the surface sediment PCB concentrations, water column concentrations are projected to continue to decline by about 80% to 90% over the modeled period under natural attenuation. Results show additional reductions are achieved by bank stabilization (90% to 95%), and dredging and capping (99%).

4.4 Compliance with ARARs

KALSIM results, as shown in Appendix S-8, Figures 4-4a, 4-4b, and 4-4c also show that, despite the dramatic (80% to 90%) reductions in average PCB concentrations in the water column that are projected to occur throughout the Site due to natural

➤ Even for the most aggressive of remedial alternatives, the Michigan surface water quality criterion of 0.000028 g/l would not be achieved.

attenuation processes, at the end of the forecast the average concentrations are projected to be over 0.0001 • g/l. Even for the most aggressive of remedial alternatives, the Michigan surface water quality criterion of 0.000026 • g/l would not be achieved due to the presence of ubiquitous PCB sources upstream of the Site and given the practical limitations of remediation efficiencies. Therefore, the water quality ARAR would have to be waived for the implementation of any of the remedial alternatives described in the FS Report (BBL, 2000b).

4.5 Long-Term Effectiveness and Permanence

The KALSIM model results show that the processes of natural attenuation (burial, resuspension, redistribution) will be effective over the 40-year forecasts. This is evident by examining the projections of surface sediment PCB concentrations over time,

> The benefits of reducing sources by stabilizing the banks of the former impoundments term are projected to be within 2% to 3% of the concentrations that would occur through dredging or capping.

presented in Appendix S-8, Figures 4-1a through 4-1j. The additional decreases in surficial sediment PCB concentrations under the river-wide capping and river-wide dredging scenarios are not seen until well into the future. Assuming even the most aggressive schedule and efficiency of dredging or capping operations, the delayed benefits of the river-wide capping and river-wide dredging alternatives occur due to the very long implementation times for these alternatives. The benefits of reducing sources by stabilizing the banks of the former impoundments (declines of 93% to 97% in surface sediment PCB concentrations in most reaches) are seen more immediately, and over the long term are projected to be within 2% to 3% of the concentrations that would occur through dredging or capping.

In addition, a wind-wave, shear stress analysis of Lake Allegan was performed using the ACES steady-state wind-wave model (see Appendix S-8, Section 6). ACES is a U.S. Army Coastal Engineer Research Center modeling tool, and was used to evaluate whether Lake Allegan sediments are subject to significant resuspension during wind events. The evaluation suggests that wind-wave resuspension in Lake Allegan is not a significant concern with respect to the stability of the sediment bed. This conclusion further supports the long-term effectiveness of natural attenuation in Lake Allegan, and provides evidence of the permanence of the surficial sediment PCB concentration reductions that are attributed to natural attenuation processes.

4.6 Short-Term Effectiveness

Section 5.6 of the FS Report (BBL, 2000b) discusses the short-term effectiveness of each remedial alternative. The KALSIM model provides the necessary support to show the need for remedial alternatives to be conceptualized on a river-wide basis, as discussed in Section 4.1 of this Supplement. With the clear need to address sediment risk issues

on a river-wide basis, the length of the remedial alternative implementation times are supported, and the associated short-term impacts must be considered as occurring over decades for Alternatives 4 and 5.

Further refinements to the KALSIM model, as discussed in Appendix S-8, Section 7, will allow for consideration of water column impacts on biota during the implementation of the dredging alternative.

4.7 Implementability

The detailed evaluation of Alternatives 3, 4, and 5 describe the general conditions in the Kalamazoo River that may affect implementation of the remedial alternatives. In particular, the conditions of the banks in the former impoundments and the

> The presence of large amounts of debris within the Kalamazoo River would have significant impacts on the ability to successfully implement dredging or capping.

bottom of Lake Allegan are identified as being of interest as significant obstructions were thought to be present in those areas. To understand the nature of those obstructions, and to further refine the effects they may have on the implementability of the remedial alternatives, a tree count was performed river-wide and a diver survey executed in Lake Allegan.

The tree counts were performed on a spot-basis throughout the Site during the June 2000 field visit described in Appendix A to the FS Report (BBL, 2000b). Trees with diameters greater than 1 inch were counted both at the water line and in a 30-foot wide strip along the river's edge. The water line tree count helps characterize the numbers of trees that may need to be removed prior to dredging activities, since they would be subject to collapse into the channel as the toe of the riverbank is removed. The 30-foot strip tree count helps to characterize the extent of grubbing and clearing efforts that would be necessary prior to the construction of access roads and staging areas, both in the former impoundment areas and throughout the Site where river access would be needed for placing dredging or capping equipment (and where cleared areas were not available).

The tree counts performed in June 2000 found 30 to 70 trees (>1 inch diameter) per 100 feet along the water line, and 130 to 150 trees (>1 inch diameter) in a typical 30-foot wide by 100-foot strip along the river's edge.

Dredging and capping have been developed as river-wide alternatives, and would involve construction activities throughout the Site. The presence of large amounts of debris, including trees, stumps, trash or other solid waste within the Kalamazoo River would have significant impacts on the ability to successfully implement dredging or capping, and was anticipated in the development of the schedules and cost estimates for Alternatives 4 and 5. To verify the presence

of these obstructions in Lake Allegan, a diver-based survey of the lake was performed in August and September 2000. The results are presented in Appendix S-5.

The diver reconnaissance survey confirmed the presence of thousands of trees and logs along the banks and shallow, near-shore areas of Lake Allegan. In addition, several large stump fields were identified on the bottom of the lake, some as large as 5,000 square feet. Individual stumps up to 36 inches in diameter were found. The presence of such debris in Lake Allegan confirms anecdotal reports and observations by field sampling crews that most, if not all, of the impounded areas on the Kalamazoo River were at least partially forested and were logged prior to dam construction and flooding. These stumps, stump fields, and other woody debris would require extensive clearing prior to dredging or cap construction, and would add significant time and costs to the overall project.

4.8 Conclusions

In summary, the combined information from the additional investigations and the KALSIM modeling effort demonstrates that the preferred remedy identified in the FS Report (BBL, 2000b) is the optimal choice for the Site by: 1) providing quantitative evidence of the effectiveness and permanence of natural attenuation as the mechanism reducing surficial sediment PCB concentrations; 2) providing quantitative evidence that stabilization of the banks of the former impoundments would eliminate the largest remaining external source of PCB; 3) showing that significant obstructions on the river bottom and banks of the Site would severely reduce the effectiveness of river-wide dredging or river-wide capping and cause serious implementation problems; and 4) providing quantitative evidence that the incremental benefit of river-wide dredging or river-wide capping over the ongoing natural attenuation process is small and occurs over the same time scale.

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BLASLAND, BOUCK & LEE, INC.
engineers & scientists

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REPLY TO:

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February 8, 2000

Dr. Mark Brown
Blasland, Bouck & Lee
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Syracuse, New York 13214-0066



SUBJECT: Final Remedial Investigation/Feasibility Study Schedule for the Allied
Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Dear Dr. Brown:

The Michigan Department of Environmental Quality (MDEQ) has reviewed your letters dated January 14, 2000 and January 28, 2000 regarding revisions to the remedial investigation/feasibility study (RI/FS) schedule by reducing the sampling and analysis effort for Phase I and Phase II sediment sampling. The MDEQ appreciates the Kalamazoo River Study Group (KRSRG) commitment to complete the Remedial Investigation/Feasibility Study (RI/FS) schedule by the end of this year, however the MDEQ cannot support the reduction of sampling effort to accomplish this goal. The sediment sampling contained in the approved work plan is the bare minimum needed to characterize the site. Based upon our careful analysis of both the sediment sampling and RI/FS schedule, it has been determined that a Technical Memoranda for the on-going sediment investigation will not be required by the MDEQ, under the Administrative Order by Consent. However, it has also been determined that the Alternatives Array Document, which is a crucial part of the FS process, will be required.

As you will recall from our discussions at the January 20, 2000, meeting there was only one item in the Phase 2 sediment sampling that is in conflict with the site task schedule. Consequently, the only change in the schedule that was contemplated by the MDEQ would be related to that one item (i.e. phased core sampling for grain size vs. polychlorinated biphenyl [PCB] concentration). The MDEQ has reviewed your letters and compared KRSRG's schedules to the MDEQ/United States Environmental Protection Agency (U.S. EPA) schedule and have produced a final schedule for the Phase 1 and Phase 2 work. This final schedule represents a significant compromise from the MDEQ's original schedule and the MDEQ is not willing to accept any additional delays in this schedule. If for some reason the KRSRG is unwilling to agree to this schedule or

February 8, 2000

are unable to meet the schedule please notify me in writing no later than February 21, 2000. The MDEQ cannot afford to have this work effort delayed any longer and if necessary will take steps to assure that this schedule is met. I have attached the final schedules for both Phase 1 and Phase 2. These schedules have been forwarded to the U.S. EPA and will be presented at all up-coming public meetings.

1.0 Technical Memorandums 10, 12 14,& 16

The Technical Memoranda (TMs) written by BB&L, on behalf of the KRSG, in general contains numerous errors, inappropriate information, incorrect calculation parameters, and are missing significant support documentation. Several of these problems continue to exist and new ones were being created in spite of the KRSG submitting numerous revisions of the TMs in attempts to address the problems identified in the MDEQ comments. As you are well aware, during the last year the MDEQ has made a concerted effort to work with the KRSG to resolve the numerous deficiencies in the TMs so they could be approved. These deficiencies and the KRSG's inability to correct the deficiencies were the topics of discussion during our conference call on January 24, 2000. During this call the following agreements were reached:

1. All parties agreed that the TMs, as submitted by KRSG to the MDEQ are technically incomplete and inaccurate and need to be corrected in a timely manner;
2. All parties agreed that the quality control review conducted on the TMs by the KRSG/BB&L in the past was not adequate. Starting immediately, the appropriate staff from BB&L and the KRSG shall conduct a thorough review to ensure accuracy and completeness of all documents prior to their submittal to the MDEQ.
3. The KRSG shall submit all necessary backup material requested by the MDEQ to finalize our review of these TMs. The MDEQ requests that all information be submitted no later than February 11, 2000 for TM 12 and February 18, 2000 for TMs 10 & 16. The MDEQ will submit final TMs sixty days after receiving all the necessary missing backup data. The KRSG will submit final TMs to the MDEQ 15 days after receiving the MDEQ electronic and hard copy files. The MDEQ cannot agree to the schedule listed in your letter for the TMs because the past history indicates that the KRSG/BB&L may not be able to provide the missing backup data by the agreed upon date. Without this information the MDEQ cannot complete its review and re-write.

4. As agreed, once the MDEQ receives the missing information we will re-write (using bold and strike out) the text and submit the draft final documents to KRSG/BB&L. The KRSG/BB&L will final the documents without any further changes.

The MDEQ hopes that these steps will be adequate to correct these serious problems and prevent any further delays.

However, the MDEQ does not consider the finalization of the TMs is not a critical path item and does not control the writing of the RI/FS. The clock for drafting the RI started in December 1999. The MDEQ believes that its original proposed schedule contains ample time to complete all tasks, however to address the KRSG's concerns the MDEQ has extended that time in the final schedule by several months. Because of this, the MDEQ would be reluctant to extend this schedule any further without significant justification from the KRSG. The MDEQ must recommend that the KRSG/BB&L focus their resources on the required tasks. The MDEQ has made several requests for increases in level of effort to no avail. The MDEQ views the laboratory capacity, number of field teams and office support staff to be the limiting factors on completing the work in compliance with the final schedule. The MDEQ requests once again that KRSG/BB&L increase the level of effort on their part to complete all the work within the time allowed in the final schedule.

2.0 Frozen 1993 Sediment Cores-Phase I

All samples (per the approved Sediment Sampling Work Plan) identified by MDEQ staff and oversight personnel for analysis shall be completed by February 14, 2000. This data shall be submitted in both an electronic copy and a hard copy to the MDEQ Project Manager no later than March 15, 2000.

3.0. Kalamazoo River Sediment Samples-Phase II

The MDEQ has reviewed the existing data and found no evidence of a significant relationship between grain size and PCB concentrations. Therefore based on the data the MDEQ cannot agree that this relationship exists. However, the KRSG believes that the relationship may exist and may be useful. The MDEQ agrees to the following change in procedure for sediment sampling to allow the KRSG to collect the most crucial data first. The KRSG shall focus the collection efforts on the first 63 samples from the Kalamazoo River identified in the approved Sediment Sampling Work Plan, and submit them for analysis immediately. The KRSG will submit all data and supporting information to the MDEQ in both hard copy and electronic format no later than May 5, 2000. However, after collecting this first group of cores the KRSG shall continue

collecting the remaining sediment cores and placed in the freezer until the MDEQ has reviewed the results from the 63 cores. Based upon the data from the 63 cores the MDEQ will determine if any scaling back in sediment sampling and analysis will occur.

4.0 Ottawa Marsh, Pottowatamie Marsh, and Kalamazoo Lake- Phase II

First collect 50 cores from each of the Ottawa Marsh, Pottowatamie Marsh and Kalamazoo Lake as identified in the approved Sediment Sampling Work Plan. Submit them for analysis per the Work Plan, and continue collecting the remaining cores. The data and all supporting information from the first 150 cores shall be submitted to the MDEQ for review no later than June 2, 2000. The remaining sampling effort may be reduced based upon the MDEQ's review of the data collected from the original 150 cores.

5.0 Floodplain Soil Sampling

The KRSG will collect all ten cores from each transect as identified in the approved Sediment Sampling Work Plan and submit them for analysis.

To meet the RI/FS schedule listed below and not reduce the sampling effort, the MDEQ believes that the KRSG should increase its level of effort and begin working on the Draft RI/FS report immediately. Also, the KRSG must provide all necessary backup data for a thorough review of TMs 10, 12, 14, & 16 as previously discussed.

Draft Phase I RI/FS to MDEQ.....June 16, 2000

Final Phase I RI/FS to MDEQ.....August 18, 2000

Draft Phase II RI/FS to MDEQ.....August 11, 2000

Final Phase II RI/FS to MDEQ.....October 13, 2000

The MDEQ will take at a minimum thirty (30) days to review each of the draft documents. Should the review take longer than 30 days, the MDEQ will make modifications to the schedule to accommodate the additional review time.

The MDEQ appreciates your cooperation in meeting the RI/FS schedule, and should you have any questions regarding this letter please feel free to contact me.

February 8, 2000

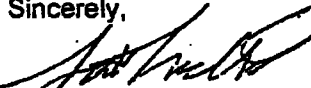
6.0 ADDITION OF OPERABLE UNITS (OUs) TO THE SITE

During the MDEQ's December 8, 1999, meeting with the U.S. EPA it was decided that the 80 miles of the Kalamazoo River and Portage Creek that represent the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site shall be divided into a total of 12 OUs. By way of this letter, the MDEQ is formally notifying the KRSG that the site has been divided into 12 OUs to facilitate the remediation of the site. The OUs at the site are as follows:

- Allied Paper, Inc.-OU 1
- Willow Boulevard/A-Site-OU 2
- King Highway Landfill-OU 3
- 12th Street Landfill-OU 4
- Lake Allegan Dam to Lake Michigan-OU 5
- Morrow Dam to the city of Plainwell and all of Portage Creek downstream of Alcott Street-OU 6
- City of Plainwell to Plainwell Dam-OU 7
- Plainwell Dam to Otsego City Dam-OU 8
- Otsego City Dam to Otsego Dam-OU 9
- Otsego Dam to Trowbridge Dam-OU 10
- Trowbridge Dam to Allegan City Dam-OU 11
- Allegan City Dam to Lake Allegan Dam-OU 12

If you have any questions concerning these matters, please contact me.

Sincerely,



Scott Cornelius
Project Manager
Superfund Section
Environmental Response Division
517-373-7367

Attachment

cc: Mr. James Hahnenberg, U.S. EPA
Ms. Joyce S. Schlesinger, Environ
Ms. Cynthia V. Bailey, Fort James Corporation
Mr. Gus Moody, Fort James Corporation
Ms. Bonnie A. Barnett, Drinker, Biddle & Reath
Mr. J. Michael Davis, Georgia-Pacific Corporation
Mr. Paul Montney, Georgia-Pacific Corporation
Ms. Kathy E. B. Robb, Hunton & Williams
Mr. Alan J. Howard, MDEQ
Mr. Keith Krawczyk, MDEQ
File Kalamazoo River H4

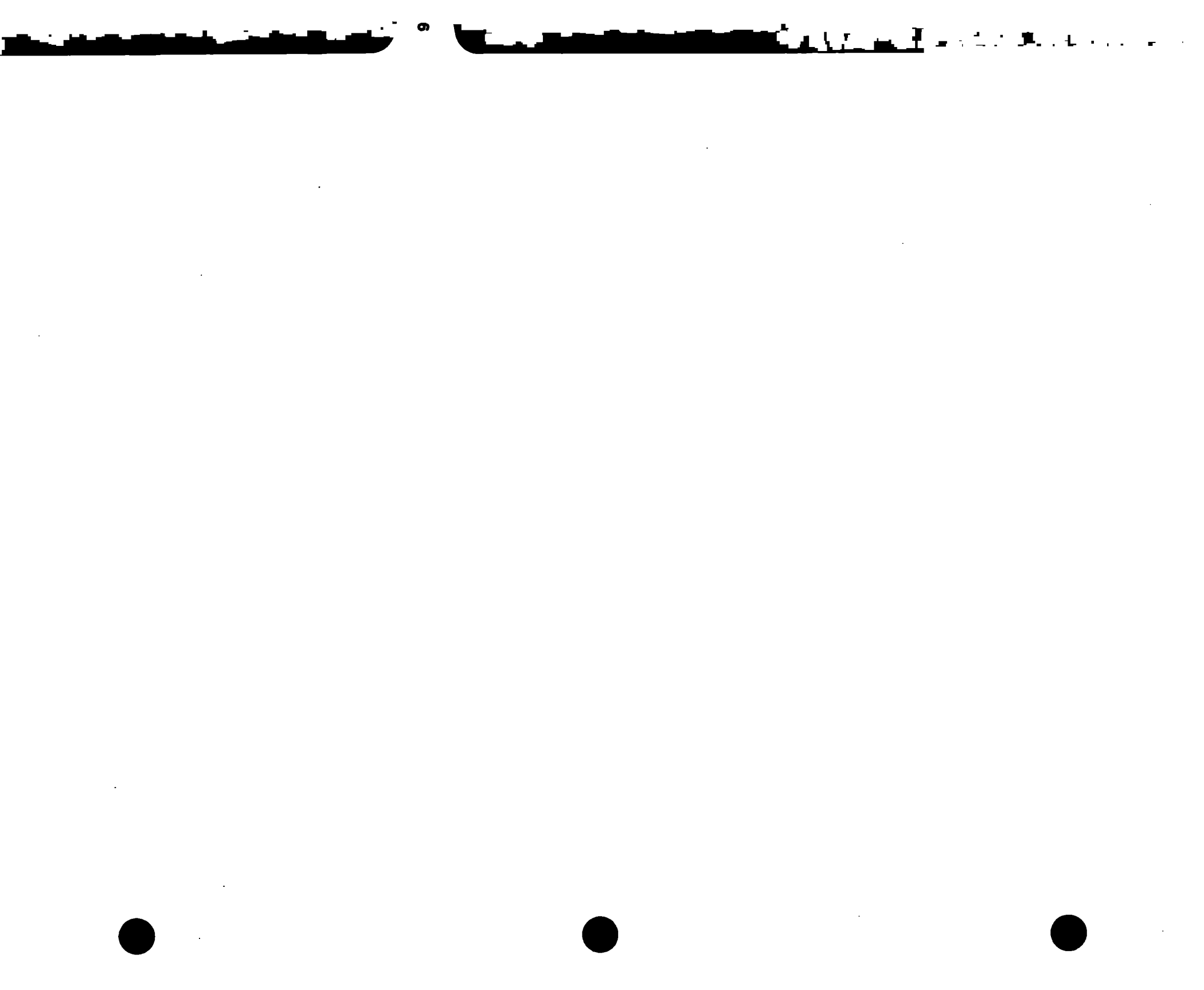
WYDQ003928

Task Description	Start Date	End/Due Date	Number of Weeks
PHASE 1 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY			
1. Phase 1 Frozen 1993 Sediment Core Processing and Analysis	12/7/99	2/14/00	10 weeks
2. Phase 1 Focused Sampling and Analysis	3/13/00	4/28/00	7 weeks
3. KRSG Provides all Necessary Backup Data for TMs 10, 12, 14, & 16	-	2/11 & 18/00	
4. MDEQ Provides Final Copies of TMs 10, 11, 12, 14, & 16 to KRSG	2/21/00	3/24/00	5 weeks
5. KRSG Finalizes TMs 10, 11, 12, 14 & 16	3/27/00	4/7/00	3 weeks
6. MDEQ Finalizes HHRA		4/21/00	
7. Draft Phase 1 RI/FS from KRSG to MDEQ	1/20/00	6/16/00	15 weeks
8. MDEQ Reviews Draft RI/FS	6/19/00	7/28/00	6 weeks
9. KRSG Submits final RI/FS to MDEQ	7/31/00	8/18/00	3 weeks
10. MDEQ Submits Draft Proposed Plan to EPA and KRSG	8/25/00	9/8/00	2 weeks
11. MDEQ Finalizes Proposed Plan	9/11/00	9/22/00	2 weeks
12. Public Comment on the Proposed Plan	9/25/00	11/3/00	7 weeks
13. Responsiveness Summary Complete	11/6/00	11/24/00	3 weeks
14. Final ROD	11/27/00	1/26/01	9 weeks
15. MDEQ Finalizes AOC & SOW	1/29/01	2/26/01	4 weeks
16. KRSG Submits Draft RD Documents to MDEQ	Not Yet Determined	Not Yet Determined	Not Yet Determined
17. MDEQ Submits Draft Final RD Documents to KRSG	Not Yet Determined	Not Yet Determined	Not Yet Determined
18. Remedial Action Starts	Not Yet Determined	Not Yet Determined	Not Yet Determined

WYDQ003929

Task Description	Start Date	End/Due Date	Number of Weeks
PHASE 2 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY			
1. Phase 2 Marsh/Lake Sediment Sampling and Analysis	1/10/00	6/2/00	21 weeks
2. Phase 2 Kalamazoo River Sediment Sampling and Analysis	1/10/00	5/5/00	17 weeks
3. Phase 2 Flood Plain Sampling and Analysis	3/20/00	5/5/00	7 weeks
4. Draft Phase 2 RI/FS from KRSG to MDEQ	1/20/00	8/11/00	30 weeks
5. MDEQ Reviews Draft RI/FS	8/14/00	9/22/00	6 weeks
6. KRSG Submits final RI/FS to MDEQ	9/25/00	10/13/00	3 weeks
7. MDEQ Submits Draft Proposed Plan to EPA and KRSG	10/16/99	10/27/00	2 weeks
8. MDEQ Finalizes Proposed Plan	10/30/00	11/10/00	2 weeks
9. Public Comment on the Proposed Plan	11/13/00	12/29/00	7 weeks
10. Responsiveness Summary Complete	1/2/01	1/19/00	3 weeks
11. Final ROD	1/22/00	3/23/01	9 weeks
12. MDEQ Finalizes AOC & SOW	3/28/01	4/20/01	4 weeks
13. KRSG Submits Draft RD Documents to MDEQ	Not Yet Determined	Not Yet Determined	Not Yet Determined
14. MDEQ Submits Draft Final RD Documents to KRSG	Not Yet Determined	Not Yet Determined	Not Yet Determined
15. Remedial Action Starts	Not Yet Determined	Not Yet Determined	Not Yet Determined

WYDQ003930





*GEORGIA-PACIFIC CONSUMER PRODUCTS LP VS.
NCR CORPORATION*

*PAUL BUCHOLTZ
November 10, 2014*

Ellen Grauer
COURT REPORTING
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3 SOUTHERN DIVISION

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7 Plaintiffs,

8 vs.

9 NCR CORPORATION, INTERNATIONAL PAPER CO.,
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11 Defendants.

12 Case No. 11-cv-00483

13 Hon. Robert J. Jonker

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16 ALSO PRESENT:

17 Lauren A. Reid - Attorney General's Office

18 Daria Devantier - State Department of Environmental Quality

19 Ben Solorzano - Video Technician

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25

1 ----- I N D E X -----

2	WITNESS	EXAMINATION BY	PAGE
3	PAUL BUCHOLTZ	MR. SHEBELSKIE	287, 507
4		MR. DUNNING	420
5		MR. PARKER	468, 530

8 ----- E X H I B I T S -----

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4	Exhibit 2415 Order of Determination	377
5	Exhibit 2416 Opinion and Order	407
6	DEFENDANTS'	
7	Exhibit 7058 8-28-1990 Letter	421
8	Exhibit 7059 2002 MDEQ Comments	445

(EXHIBITS TO BE PRODUCED)

1 BUCHOLTZ

2 data that was an add-on to the draft RI/FRS for
3 operable unit five --

4 MR. DUNNING: Objection.

5 BY MR. SHEBELSKIE:

6 Q. -- do you remember that?

7 MR. DUNNING: Object to the form.

8 A. I just don't want to -- I want to be clear in my
9 response.

10 BY MR. SHEBELSKIE:

11 Q. Oh, sure, sure-sure-sure.

12 A. I'm not really -- just the time frame, are we talking
13 about 2000 or subsequent RI/FS attempts?

14 Q. In the 2000 time frame.

15 A. Okay.

16 Q. All right, do you have that focus in your mind?

17 A. Yes, the supplemental investigation from November of
18 2000.

19 Q. And you testified that the department had not
20 authorized or directed that sampling or additional
21 work to be done?

22 A. That's correct.

23 Q. All right. Do you know, though, whether EPA has made
24 any use of that data?

25 A. In our subsequent efforts at producing the

BUCHOLTZ

supplemental remedial investigation report for area one, within OU-5, we've gone through that effort of kind of qualifying the data, so, you know, if people get hungry for data it's there, it's identified in the data sets that we use, but certainly it's flagged as being data that was collected outside of the typical approved process.

Q. You used the term "qualifying the data"?

A. Yeah.

Q. What does that mean?

A. Well, there's a ranking system, generally, that we went through in, you know, 2007, after we were trying to develop these reports and just wanted to understand how to handle the different data sets, because there have been so many sets of data collected over the years. We just kind of ranked out the data. I believe it's spelled out more specifically in the SIR report for area one for OU-5.

Q. And subject to check on the document, do you recall where this supplemental data fell out on the ranking from the qualification process?

A. Just it's flagged as having been collected outside of typical approved work plans, as I recall, but typically when we go through and are developing our

1 BUCHOLTZ

2 SWAK estimates or trying to understand average
3 concentrations, that data usually makes it into the
4 analysis.

5 Q. I see, so though this data was collected outside the
6 standard process, has EPA and the department,
7 nonetheless, found it sufficiently reliable to use in
8 its analyses about the path forward for OU-5?

9 MR. DUNNING: Object to the form.

10 A. So long as we understand the nature of the data,
11 that's right, we find ways to incorporate it.

12 BY MR. SHEBELSKIE:

13 Q. Continuing with the draft RI/FS report, you were shown
14 Exhibit 7059. That's the largest size package,
15 comment package?

16 A. Yes.

17 Q. Do you have that in front of you, sir?

18 A. I do, yes.

19 Q. All right. And the first tabbed page in this exhibit
20 with the yellow -- or you have blue tabs, I have
21 yellow.

22 A. Yes.

23 Q. But on the -- it's the first page of the May 11th,
24 2001, document addressed to Brian von Gunten?

25 A. Yes, that's correct.

BUCHOLTZ

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Q. And you identify these as EPA comments on the draft RI/FS, correct?

A. It's my understanding that, yes, these were EPA's comments on the October 2000 draft.

Q. And now this document itself is stamped "draft." Do you see that on the first page?

A. I do, yes.

Q. And if you flip through the ensuing pages, going on all the way up at least through page 27 of the document, again, it's marked "draft," right?

A. Yes, that seems to be the case, for the most part.

Q. All right. And did the EPA mark this as draft?

A. That would be my assumption.

Q. This is not something, this draft stamp is not something you would see in the normal practices of the department, correct?

A. I wouldn't say that. I think draft stamps are very common.

Q. Yeah, that was a bad question. Based on your work on this site and on the draft RI/FS, it's your understanding that it was the EPA that put this draft stamp on this particular document?

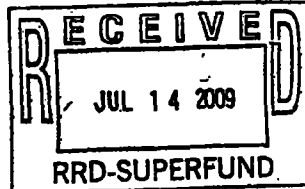
A. That would be my understanding, that's correct.

Q. And, also, if you would flip through the rest of this





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590



REPLY TO THE ATTENTION OF:

July 9, 2009

Mr. Michael J. Erickson
Associate Vice President/Principal Engineer
ARCADIS
10559 Citation Drive, Suite 100
Brighton, MI 48116

SR-6J

RE: Request for Data Usability Determination

Dear Mr. Erickson:

The United States Environmental Protection Agency (EPA) has completed its review of the request for data usability determination for existing Kalamazoo River data for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The purpose of the request is to determine the usability of existing data for the Supplemental Remedial Investigation/Feasibility Study (SRI/FS).

The existing site data was separated into the following categories for consideration of the usability request:

1. Data collected according to approved Work Plans, Field Sampling Plans, and Quality Assurance Project Plans and subject to field oversight by the Agencies.
2. Data collected at the direction of either the Michigan Department of Environmental Quality or EPA following project Standard Operating Procedures (SOPs) for sampling and validation and the effort was subject to field oversight by the Agencies.
3. Site-specific data collected by various governmental agencies.
4. Data collected for the Supplemental Investigation utilizing SOPs for field sampling, analysis and data validation; however, the work was not performed under an Agency-approved work plan and no field oversight was performed.

5. Historical data collected prior to the RI/FS process. This data may not have been collected utilizing approved work plans, sample plans or quality assurance project plans and have not been validated with the rigor of more recent SRI/FS data.

EPA further evaluated if the data may be included in the project database to supplement future studies. This determination is not an evaluation of how representative or complete the data sets are for meeting various project objectives, as use of the data is limited to the applicable data quality objectives of the study.

EPA received hard copy laboratory analytical reports with the data validation summaries from ARCADIS/BBL and reviewed 10 data packages, representing approximately 1% of the results. The data packages selected for review were from the supplemental investigation sampling events which were performed without Agency approval or oversight. The data packages included sediment, groundwater, surface water, and fish tissue results.

As a result of the review and consideration of potential uses for the data, EPA has the following recommendations on the usability of the above-mentioned categories of data:

- Categories 1 and 2 - Data were collected following an administrative approval and oversight process. These data are acceptable for inclusion in the existing project database to supplement future studies and evaluations.
- Category 3 - Data collected by various state and federal agencies may be included in the database and used as appropriate. Data that was not collected and validated utilizing site-specific SOPs should be flagged. Physical data may be used if field notes and raw data sheets are included in published reports verifying the information.
- Category 4 - EPA reviewed ten data packages provided by ARCADIS/BBL. These data packages were selected to represent over 949 data packages analyzed since 1993. Based on the data packages reviewed, the data analysis and validation appear to be consistent with the approved QAPP and SOPs in place at the time of analysis, but without following an administrative review and approval process or field oversight. These data may be considered as supplemental information and included in the project database with a flag identifying it. When used in

evaluations or reports, a brief description of the data limitations should be included in the text. Tables and figures should include flags on the data and notations indicating that the data was collected without Agency review or approval of work plans or field oversight.

- Category 5 - Historical data collected prior to the RI/FS process was not collected under the same procedures and protocols as the RI/FS data. The data should only be used for qualitative evaluations providing a historical perspective. When used in evaluations or reports, a brief description of the data limitations should be included in the text. Tables and figures must include notations identifying the data and indicating that it was not collected using approved plans.

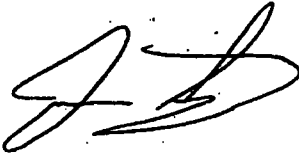
In summary, EPA's review of the subset of data packages did not identify issues with the data. The data can be used when flagged appropriately and in the proper context. In addition to flagging the results, the following conditions apply:

- The data can be used as a part of the data set when appropriately flagged and noted, but decisions should not be made solely on or heavily weighted on the Supplemental Investigation data (Category 4), historic data collected prior to the RI/FS process (Category 5), or other flagged data.
- The data usability could be subject to further evaluation by EPA as deemed appropriate.
- This determination is not an evaluation of how representative or complete the data sets are for meeting various project objectives.
- The determination of usability does not extend to approval of the conclusions drawn from use of the data.

- 4 -

Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,

A handwritten signature in dark ink, appearing to be 'J. Saric', written in a cursive style.

James A. Saric
Remedial Project Manager
SFD Remedial Response Branch #1

cc: Paul Bucholtz, MDEQ
Gary Griffith, Georgia-Pacific
Richard Gay, Weyerhaeuser

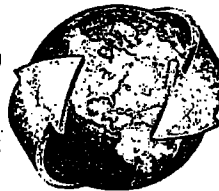
[REDACTED]

[REDACTED]

*GEORGIA-PACIFIC CONSUMER PRODUCTS LP VS.
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*PAUL BUCHOLTZ
November 10, 2014*

Ellen Grauer
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10 Case No. 11-cv-00483

Hon. Robert J. Jonker

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16 ALSO PRESENT:

17 Lauren A. Reid - Attorney General's Office

18 Daria Devantier - State Department of Environmental Quality

19 Ben Solorzano - Video Technician

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4 Exhibit 2415 Order of Determination 377

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6 DEFENDANTS'

7 Exhibit 7058 8-28-1990 Letter 421

8 Exhibit 7059 2002 MDEQ Comments 445

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11 (EXHIBITS TO BE PRODUCED)

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BUCHOLTZ

interactions.

Q. And how -- could you clarify what you mean by "struggle with some of the interactions"?

A. You know, I think -- it was just, it was an environment that maybe was more prone to argument than cooperation.

Q. And why was that?

A. I don't know, that's a good question.

Q. You don't, you don't know the answer to that question?

A. You know, it just seemed to be the way that the site was going at the time.

Q. Isn't it a fairly remarkable thing for the State of Michigan to advise EPA that the PRP group should get rid of their consultant?

MR. SHEBELSKIE: Object to the form.

A. That's certainly what we requested in this version of the letter.

BY MR. DUNNING:

Q. Have you -- in your time with MDEQ, have you seen another similar recommendation?

A. Not that I recall offhand, no.

Q. And this is signed by someone for Mr. von Gunten, I think, George, is that Carpenter?

A. George Carpenter, that's correct.

BUCHOLTZ

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Q. And who is Mr. Carpenter?

A. He was a unit chief at the time, so ...

Q. Would he have been Mr. von Gunten's immediate supervisor?

A. You know, I don't recall offhand. I believe he was at the time, he was Brian's immediate supervisor.

Q. All right. And these letters, as we've discussed, communicate to EPA, as you've testified, MDEQ's position that the draft 2000 RI/FS was disapproved, right?

A. That's correct.

Q. Between the time that the draft RI/FS was submitted in 2000 and these letters in 2002, did MDEQ communicate with the KRSG and/or their consultant that MDEQ had some issues with the draft RI/FS?

A. You know, I don't recall specifically what was communicated. Certainly in their file there's lots of communication, and I would think that that was part of what was discussed in that period of time, yeah.

Q. Was there an official communication from MDEQ between 2000 and 2002 to the KRSG that MDEQ was going to disapprove the RI/FS?

A. I don't think we -- you know, the decision really wasn't made, I don't believe, until the letter went

BUCHOLTZ

out in 2002, so ...

Q. All right. Were there attempts by MDEQ to meet and discuss the deficiencies in the 2000 RI/FS with the KRSG group, do you recall?

A. As I recall, there were, yes.

Q. And do you recall from your review of the file and maybe your own personal involvement in those meetings what -- the nature of those conversations?

A. You know, I think the best part of the record that speaks to that is some additional alternatives that were developed. I can't remember the name of the document specifically, but there were several impoundment approaches that were developed by the KRSG at the request of the DEQ.

Q. Between 2000 and 2002?

A. That's correct, yes.

Q. And did anything ever come of that document?

A. I believe it's identified in the comment -- in the comments, detailed comments from July of 2002.

Q. All right. And are you also aware that at the same time or about the same time, in October of 2000, that the KRSG submitted what's been referred to as the supplemental investigation?

A. Yes, I'm aware of that.

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Q. Can you describe what that was?

A. I guess a summary description would be that it was some additional data that had been collected by the KRSG. As I recall, it was outside of approved work plans. But that data was compiled and submitted for additional consideration by the agencies as they reviewed the RI report, RI/FS.

Q. Was that work -- and is it okay if we call it the supplemental investigation?

A. Yeah, that will be fine.

Q. We'll know what we're talking about?

A. We will --

Q. All right.

A. -- for the context of this, yes.

Q. Was that work that MDEQ asked the KRSG to perform?

A. Not that I recall, no.

Q. Was it work that MDEQ directed the KRSG to perform?

A. I don't recall us being involved in the development or implementation of that work.

Q. So does that mean that MDEQ also did not have an opportunity to review work plans or sampling plans in putting that data together?

A. You know, I don't recall the level of involvement that we had at this time. We might have been -- had a

BUCHOLTZ

chance to review some of those, but I don't recall, specifically.

Q. All right. And did MDEQ consider that work to be necessary work to investigate the site?

A. I don't think it was at the time considered necessary. It wasn't something that we had seen as a fundamental piece to review the RI/FS.

Q. Right, because you didn't ask them to do it, right?

A. Essentially, I think that's how I recall, yes.

Q. The MDEQ didn't ask them to --

A. We did not ask for this work to be done, that's correct.

Q. And then did KRSR attempt to include that work in the draft 2000 RI/FS?

A. I don't recall. I think they did not, and that's why we received the supplemental information.

Q. Because it was not included?

A. Correct.

Q. And was it MDEQ's decision to not include that in the 2000 RI/FS?

A. Well, I don't remember specifically how that broke down, but in the end of things, there was a separate document that was submitted, the supplemental investigation with that information, and it was

BUCHOLTZ

requested that it be considered during a review of the RI/FS, but it was not officially part of the RI/FS.

Q. And was that situation that you just described pursuant to MDEQ's decision that it would not be part of the RI/FS?

A. I don't recall specifically how all those played out, but there was some hesitation on the part of the DEQ to, or at least trying to figure out how to incorporate that information into the review process.

Q. And can you describe that hesitation?

A. Well, just with not fully understanding the nature of the data collection, it just became another piece to try and integrate, which, you know, at the time we were pretty busy trying to process the information that was presented.

Q. And you were trying to piece that together and having that difficulty because MDEQ didn't have any involvement in developing the work plans or the sampling plans to obtain that data, right?

MR. SHEBELSKIE: Object to the form.

A. Well, again, I don't recall the specifics. I know that we did not specifically request the data to be generated, but as the work plans were being put together, I don't recall if they might have been

1 BUCHOLTZ

2 shared at some point along the way with us, but it
3 wasn't our typical review process, as I recall from
4 reviewing the file.

5 BY MR. DUNNING:

6 Q. It was a different process than what was normally
7 going on under the AOC?

8 A. Yes. As I recall, it was more of a double-track
9 process there.

10 Q. Going back to thinking about the 2000 RI/FS, we
11 talked -- you testified just a bit ago about a comment
12 package that MDEQ put together for EPA with respect to
13 the RI/FS, do you recall that?

14 A. Yes, I do.

15 Q. So I'm going to hand you a new document, and I think
16 this will be 7059.

17 MARKED FOR IDENTIFICATION:

18 DEPOSITION EXHIBIT 7059

19 1:38 p.m.

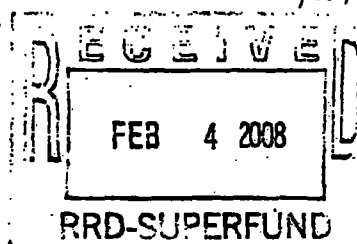
20 MR. DUNNING: And I have -- this document
21 we've just recently obtained from MDEQ. It doesn't
22 have Bates numbers on it, and so I've tabbed -- for
23 the record, I've tabbed the copy so that we'll be able
24 to refer to portions of this with a little bit more
25 ease, I hope.

[REDACTED]

[REDACTED]



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590



January 28, 2008

REPLY TO THE ATTENTION OF:

Mr. Michael J. Erickson
Senior Engineer II/Associate
ARCADIS
10559 Citation Drive, Suite 100
Brighton, MI 48116

SR-6J

RE: Risk Assessment Framework

Dear Mr. Erickson:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the Risk Assessment Framework (RAF) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The RAF is designed to serve as the basis for performing risk assessments in each area of the river within Operable Unit (OU) 5.

The Kalamazoo River Study Group (KRSNG) originally submitted a draft RAF in April 2007. Representatives of the U.S. EPA, Michigan Department of Environmental Quality (MDEQ), as well as KRSNG met on July 10, 2007, to discuss the scope of and necessary revisions to the draft RAF. At that meeting U.S. EPA presented its concerns with KRSNG revisiting risk assessment issues that had already been resolved in previous documents. U.S. EPA and MDEQ expressed their belief that such an approach to the RAF would not assist U.S. EPA's ultimate need to make risk management decisions. All parties agreed that to maintain progress at the site, re-creating previously approved documents and debating previously resolved issues would not be the best use of resources.

In October 2007, KRSNG resubmitted the draft RAF. This document is not significantly different from the original version. However, like the earlier draft, the RAF does not adequately address the role of the previously approved Human Health and Ecological Risk Assessments in the development of Area-Specific Risk Assessments, as specified in Section 1.2.1.5 of the Scope of Work in the 2007 Administrative Settlement Agreement and Order on Consent (AOC). Further, several of the proposed changes in the methodology for development of future Area-Specific Risk Assessments are inconsistent with U.S. EPA guidance for developing risk assessments and are therefore unacceptable to U.S. EPA.

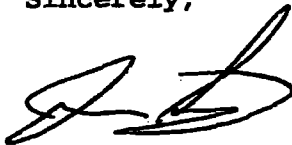
The 2003 Human Health Risk Assessment and the 2003 Ecological Risk Assessment are U.S. EPA approved documents. Although future Area-Specific Risk assessments may be produced by the KRSNG, consistent with Section IX, paragraph 33(b) of the AOC the

existing U.S. EPA approved risk assessments are the baseline from which future risk assessments should be developed. Any RAF developed by the KRSG must reference the relevant sections from the EPA risk assessments. The RAF must specify the manner in which the findings of the EPA approved risk assessments will be used in the development of future Area-Specific Risk Assessments. Area-Specific Risk Assessments can deviate from the findings of the existing EPA approved risk assessments only if new information supports such a deviation. Otherwise, the existing U.S. EPA approved risk assessments must be used.

Therefore, U.S. EPA disapproves the RAF pending receipt of adequate responses to the enclosed comments and a revised RAF document incorporating the changes. KRSG must submit a response to the comments and a revised RAF document within (45) forty-five days receipt of this letter.

Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,



James A. Saric
Remedial Project Manager
SFD Remedial Response Branch #1

Enclosure

cc: Paul Bucholtz, MDEQ
Bonnie Barnett, Drinker Biddle & Reath LLP

WYDQ003783

**U.S.EPA COMMENTS
ON THE
RISK ASSESSMENT FRAMEWORK
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SITE**

GENERAL COMMENT

Commenting Organization: U.S. EPA
Section: NA Page #: NA
Original General Comment #: 1
Comment:

Commentor: Saric
Lines #: NA

While the document claims the Kalamazoo River Study Group (KRSG) will use both the 2003 Human Health Risk Assessment (HHRA) and 2003 Ecological Risk Assessment (ERA) as a starting point, emphasis is placed throughout the document on changing factors which U.S. EPA did not agree upon in the July 10, 2007 meeting. The 2003 HHRA and ERA are U.S. EPA approved documents and are the baseline upon which all future risk assessments must be conducted. Appropriate sections of the existing approved documents should be referenced in future area-specific risk assessments. Future data obtained indicating changes in PCB concentrations (i.e. sediment or soil) should be used in area-specific risk assessments. Changing many of the factors outlined in the specific comments below, would not be the best use of resources.

Commenting Organization: U.S. EPA
Section: NA Page #: NA
Original General Comment #: 2
Comment:

Commentor: Chapman
Lines #: NA

The Risk Assessment Framework (RAF) is not consistent with KRSG's statements that the Michigan State University (MSU) studies will be used to refine the existing baseline ERA on a site-specific basis. Instead, the RAF describes implementation of completely new ERAs with re-evaluation of every step and element of the risk assessment process. The RAF even includes provisions for developing new non-site-specific data through literature reviews, which means that KRSG intends to replace even portions of the baseline ERA for which there are no new site- or area-specific data. This approach is unacceptable.

SPECIFIC COMMENT

Commenting Organization: U.S. EPA
Section: 1.1 Page #: 1-2
Original General Comment #: 1
Commentor: Saric
Lines #: NA

Comment:
The date for submittal of the Area 1 Risk Assessment work plan must be included. The date should be a specific number of days after approval of the RAF.

Commenting Organization: U.S. EPA
Section: 1.1 Page #: 1-2
Original General Comment #: 2
Commentor: Saric
Lines #: NA

Comment:
Although U.S. EPA agrees that the future risk assessments in downstream areas may reference pertinent information from the Area 1 HHRA and ERA, they should also reference pertinent information from the 2003 HHRA and ERA. Further, the Area 1 HHRA and ERA should incorporate appropriate sections by reference of the 2003 HHRA and ERA to facilitate expedited document reviews.

Commenting Organization: U.S. EPA
Section: 2.1 Page #: 2-1
Original General Comment #: 3
Commentor: Saric
Lines #: 3

Comment:
After the citation of the Baseline ERA add "this document was approved by U.S. EPA."

Commenting Organization: U.S. EPA
Section: 2.1 Page #: 2-1
Original General Comment #: 4
Commentor: Saric
Lines #: 4

Comment:
After "Baseline ERA;" insert "it is the model upon which all future ERA shall be developed. All area-specific baseline ERA should reference pertinent sections of this document."

Commenting Organization: U.S. EPA
Section: 2.1 Page #: NA
Original Specific Comment #: 5
Commentor: Chapman
Lines #: NA

Comment:
In the last paragraph - "Supplemental literature reviews" are not appropriate methods for "reducing the reliance on screening-level assumptions". This will potentially lead to protracted discussions of study selection, interpretation of results, applicability to site conditions, and relevance for

risk management decisions. In addition, at the end, the results will still be "screening-level assumptions" since they will not be derived from site-specific data. The purpose of the Supplemental Remedial Investigation is to utilize, as appropriate, site- and area-specific data to refine the existing Baseline ERA. Supplemental literature reviews do not serve this purpose and should be deleted from the RAF.

Commenting Organization: U.S. EPA
Section: 2.2 Page #: 2-2
Original General Comment #: 6
Comment:

Commentor: Saric
Lines #: NA

After the first sentence add "Each area-specific baseline ERA will use the 2003 baseline ERA as a model and will reference pertinent sections of this document."

Commenting Organization: U.S. EPA
Section: 2.2.1 Page #: NA
Original Specific Comment #: 7
Comment:

Commentor: Chapman
Lines #: NA

With regard to unique Area-specific factors, "characterization of particular habitats" should take into account the dynamic properties of habitats, that is, potential future habitats should be considered in addition to present habitat conditions. Habitat stasis is ecologically implausible.

Commenting Organization: U.S. EPA
Section: 2.2.4 Page #: NA
Original Specific Comment #: 8
Comment:

Commentor: Chapman
Lines #: NA

Potential future habitats should be considered in addition to present habitat conditions in the selection of representative receptor species.

Commenting Organization: U.S. EPA
Section: 2.2.8 Page #: NA
Original Specific Comment #: 9
Comment:

Commentor: Chapman
Lines #: NA

Assignment of higher weight to "Lines of evidence that are more Site-specific and use the most direct measures of exposure and effects" relative to "lines of evidence that rely on modeled exposures and non-Site specific effects data" is incomplete and premature. A host of factors are commonly considered in selecting weights in addition to site specificity, some examples include degree of association

from area to area, even with more extensive analyses (e.g., new fish surveys).

Fish and soil PCB concentrations most likely will be different based upon additional sampling. If clearly shown to be different, this will be the variable to apply. This approach was made clear in the July 10, 2007, meeting and was done in the U.S. EPA approved 2003 CDM HHRA.

Commenting Organization: U.S. EPA
Section: 3 Page #: NA
Original Specific Comment #: 14
Comment:

Commentor: Clark
Lines #: NA

The RAF proposes conducting a fish trend analysis for use in the baseline HHRA. U.S. EPA does not support such an approach. This exercise is not an effective use of resources. On the Fox River site, a large amount of resources were spent to assess PCB trends in fish and no definitive conclusion could be drawn. It took almost two years to settle this issue. Ultimately, fish data over the previous 10 years was used in the Fox HHRA.

At the July 10, 2007 meeting U.S. EPA indicated that trend analysis could be used in the Feasibility Study, if a post remediation model were applied.

Commenting Organization: U.S. EPA
Section: 3 Page #: NA
Original Specific Comment #: 15
Comment:

Commentor: Clark
Lines #: NA

The RAF proposes to use three Kalamazoo fish surveys to conduct more specific evaluations of intake of fish from the river. The RAF implies that each reach of the river, could have separate intake assumptions. This cannot be supported by these surveys, as they have limitations. The document also states that KRSB may also collect more fish intake information by conducting their own surveys. At the July 10, 2007 meeting U.S. EPA made it clear that these surveys have limitations and should not be the primary basis for fish intake assumption. Intake assumptions should come from the CDM methodology in the 2003 HHRA, and that used at the Fox River Site, which used large scale fishing survey data which has undergone publication and peer review.

Commenting Organization: U.S. EPA
Section: 3 Page #: NA
Original Specific Comment #: 16
Comment:

Commentor: Clark
Lines #: NA

Under toxicity assessment the document states the risk assessments will use U.S. EPA PCB factors for cancer and non-cancer. However it also states that KRSG will use "scientific literature as appropriate and consistent with current U.S. EPA guidelines". The HHRA can not deviate from U.S. EPA factors.

Commenting Organization: U.S. EPA
Section: 4 Page #: NA
Original Specific Comment #: 17
Comment:

Commentor: Chapman
Lines #: NA

Short-term risks due to constituent mobilization
Consistent with U.S. EPA (2005), mobilization related to remedial activities should be evaluated in the context of potential releases in the absence of remedial action. "When evaluating resuspension due to dredging, it generally is important to compare the degree of resuspension to the natural sediment resuspension that would continue to occur if the contaminated sediment was not dredged, and the length of time over which increased dredging-related suspension would occur." (U.S. EPA 2005).

U.S. EPA 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. Office of Solid Waste and Emergency Response. EPA-540-R-05-012.

Commenting Organization: U.S. EPA
Section: 4 Page #: NA
Original Specific Comment #: 18
Comment:

Commentor: Chapman
Lines #: NA

Habitat alterations/loss
Assessment of habitat quality is a necessary component for evaluating trade-offs between ecological impacts of remedial activities and potential impacts of no action, because concern is heightened for "rare or very sensitive habitats". Procedures for assessing habitat quality should be developed collaboratively with stakeholders, in particular, natural resource trustees.



STATE OF MICHIGAN



JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

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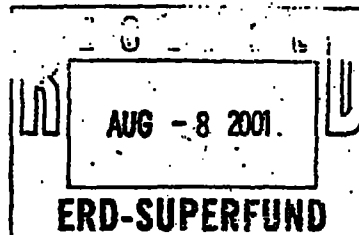
INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

RC: Brown
Claudia
Schultz
O'Donnell
M. Key
A.
Cory: Filer
Kolman

July 24, 2001

Mr. David A. Ullrich
Acting Regional Administrator
United States Environmental Protection Agency
77 West Jackson Boulevard (R-19J)
Chicago, Illinois 60604-3590



Dear Mr. Ullrich:

The Michigan Department of Environmental Quality (MDEQ) believes that the United States Environmental Protection Agency (U.S. EPA) should assume the lead for selecting the remedy for the river portion of the Kalamazoo River Superfund site, as well as the other operable units where Records of Decision have not yet been drafted. The basis for our position follows:

1. The liable parties need to resolve their liability with your agency, in addition to ours, before proceeding with remedy implementation. This requires your agency to be intimately involved with remedy selection and that the remedy be implemented pursuant to a legally binding agreement with your agency.
2. Notwithstanding the fact that the site is currently being handled as a state enforcement lead, your agency is essentially controlling the critical aspects of the remedy selection process. Your staff recently advised us that substantial additional data collection is necessary to support the U.S. EPA remedial decision-making process. This is in spite of the fact your agency worked closely with us over the last several years in developing and implementing the remedial investigations recently concluded under state orders. In addition, your agency has raised new issues relative to the adequacy of the ecological and human health risk assessments, which were prepared by the state with substantial input from U.S. EPA staff. These issues prevent us from finalizing cleanup criteria, and U.S. EPA staff have indicated that resolution of these issues is tied to the completion of your new data-collection initiative.
3. Your agency has advised us that the remedy must also be reviewed by entities outside Region 5—the National Remedy Review Board, and by a headquarters committee charged with reviewing the National Research Council's risk management strategy for polychlorinated biphenyl contaminated sediments before the U.S. EPA can select a remedial alternative.

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WYDQ002614

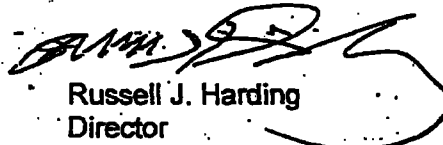
July 24, 2001

4. The U.S. EPA has also recently advised our agency and the liable parties that federal permits must be obtained for all remedial work conducted by the liable parties unless the work is carried out pursuant to a legally binding agreement with the U.S. EPA. The permit exemption in Section 121(e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 1980 PL 96-510, does not apply if the liable parties are performing work pursuant to a legal agreement with the state. The agreement must be between the liable parties and the U.S. EPA.

Please let me know when we can have staff develop a plan and schedule for implementing the transition to federal lead. We recommend that the plan for transitioning the river portion of the site be given top priority.

If you have any questions, please contact Mr. Alan J. Howard, Chief, Environmental Response Division, at 517-335-1104, or you may contact me.

Sincerely,


Russell J. Harding
Director
517-373-7917

cc: Mr. Todd Goeks, National Oceanic Atmospheric Administration
Ms. Lisa Williams, United States Fish and Wildlife Service
Mr. Arthur R. Nash Jr., Deputy Director, MDEQ
Mr. Alan J. Howard, MDEQ





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

XL: CLAUDIA
AL
O'Donnell
Anne P.
New Gibson
Schmidt

Orig: Brian V
River #1

AUG 02 2001

REPLY TO THE ATTENTION OF:

R-19J

Mr. Russell J. Harding
Michigan Department of Environmental Quality
P.O. Box 30473
Lansing, MI 48909-7973

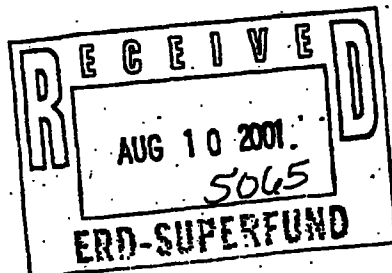
Dear Mr. Harding:

Thank you for your letter of July 24, 2001 regarding the Kalamazoo River Superfund Site in Kalamazoo, Michigan. This is to advise you that we support the Michigan Department of Environmental Quality's (MDEQ's) request that our Agency assume the lead role on this site. We are committed to working closely with your Department as we move toward the decision-making stage for this project. We are encouraged to hear that your Department will provide technical assistance and remain an active partner through the investigation and cleanup.

Our project managers have already begun to discuss the shift to a federal lead and, over the coming weeks, we will jointly develop a plan and schedule for transitioning the river and other landfill operable units associated with the Site. My goal is to keep the Kalamazoo River a valuable and viable resource for the state of Michigan, so please do not hesitate to contact me, or Mr. Bill Muno, Director of the Superfund Division, if there are any other questions or issues you would like to discuss.

Sincerely yours,

David A. Ullrich,
Acting Regional Administrator



Dir 20741
Howard - ERD
Handle as appropriate
xc: Russ Harding / 3-2 fib EPA
Nash
Hughes
Sowton
Silfven

0010547



JOHN ENGLER, Governor

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RUSSELL J. HARDING, Director

REPLY TO:

ENVIRONMENTAL RESPONSE DIVISION
KNAPP'S CENTRE
PO BOX 30425
LANSING MI 48908-7925*River HF*

August 13, 2001

Mr. Tom Short
United States Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604

Dear Mr. Short:

As a follow up to the Michigan Department of Environmental Quality (MDEQ) letter of July 24, 2001, I am writing to present a proposed transition plan for the Kalamazoo River Superfund site. We have developed this recommended transition plan considering the following key criteria:

1. Operable unit (OU) and other areas of concern
2. Stage of each OU and other areas as it relates to the Superfund process
3. Key decisions requiring United States Environmental Protection Agency (U.S. EPA) lead as identified in Director Russell J. Harding's letter
4. Ongoing technical support tasks initiated by the MDEQ to support the decision making process

Each OU and other area of concern is designated and briefly described in Table 1. The current status of each OU and other areas of concern with respect to the Superfund process and its proposed transition point from the MDEQ to the U.S. EPA lead (if applicable) is presented in Table 2. Ongoing technical support tasks are identified and briefly described in Table 3.

The MDEQ's proposed transition process is presented in the attached schedule. The MDEQ is preparing draft, detailed OU specific schedules that identify major ongoing tasks and their relationship to meeting key Superfund milestones. I will bring these draft schedules to our first transition meeting on September 4, 2001, at your office. Your comments are welcome as they will help us prepare for the meeting.

Please contact me at your earliest convenience to discuss any comments you may have. The MDEQ looks forward to the smooth and successful transition of the lead agency for the applicable portions of this site.

Sincerely,

Nancy Parsons for

Brian von Gunten
Superfund Section
Environmental Response Division
517-373-6808

0010752

WYDQ002608

Table 1 – OUs and Other Areas of Concern

Operable Unit/ Other Area of Concern	Description
OU 1 – Allied Paper, Inc.	All areas impacted by paper waste not included as part of Portage Creek, namely former HRDLs and FRDLs ¹ , Monarch FRDL, Type III landfill, and Western Disposal Area
OU 2 – Willow Boulevard/A-Site	Disposal areas adjoining Kalamazoo River on opposite bank of Georgia Pacific facility, upstream of OU 3 – King's Highway Landfill in Kalamazoo.
OU 3 – King's Highway Landfill	Disposal area adjoining Kalamazoo River and immediately opposite Georgia Pacific facility in Kalamazoo.
OU 4 – 12 th Street Landfill	Disposal area adjacent to Kalamazoo River immediately downstream of Plainwell Dam in between Plainwell and Otsego.
OU 5 – Kalamazoo River and Portage Creek (historic) OU 5 – Kalamazoo River – Phase II – Calkins Dam to Lake Michigan (current)	Original designation of non-land based OUs. Included Kalamazoo River from Morrow Pond Dam to Lake Allegan (Calkins Dam) and Portage Creek downstream of Cork Street. MDEQ has extended this OU to Lake Michigan, included associated marshes, and divided the OU upstream of Calkins Dam into seven OUs as described below.
OU 6 – Kalamazoo River and Portage Creek	Kalamazoo River from Morrow Dam to Main Street, City of Plainwell Portage Creek from Cork Street to confluence of Kalamazoo River
OU 7 – Kalamazoo River – Plainwell Impoundment	Kalamazoo River from Main Street, City of Plainwell to Plainwell Dam
OU 8 – Kalamazoo River – Otsego City Impoundment	Kalamazoo River from Plainwell Dam to Otsego City (Menasha Paper) Dam
OU 9 – Kalamazoo River – Otsego Impoundment	Kalamazoo River from Otsego City (Menasha Paper) Dam to Otsego Dam
OU 10 – Kalamazoo River – Trowbridge Impoundment	Kalamazoo River from Otsego Dam to Trowbridge Dam
OU 11 – Kalamazoo River – Allegan City Impoundment	Kalamazoo River from Trowbridge Dam to Allegan City Dam
OU 12 – Kalamazoo River – Lake Allegan Impoundment	Kalamazoo River from Allegan City Dam to Calkins (Lake Allegan) Dam
Hawthorne Paper	Property adjacent to Georgia Pacific property and Kalamazoo River. Currently owned by Georgia Pacific
King Mill Lagoons	Disposal area formerly owned by Allied Paper/Millennium Holdings, Inc. in Kalamazoo.
Georgia Pacific Five Former Lagoons	Area of Georgia Pacific property remediated and contents placed in OU 3.

Historic residual disposal lagoon (HRDL) and former residual disposal lagoon (FRDL)

Table 2 – OU and Other Areas of Concern Proposed Lead Agency Transitions

Operable Unit/ Other Area of Concern	Current Superfund Status	Transition Milestone	Key Issues
OU 1 Allied Paper, Inc.	<ul style="list-style-type: none"> Remedial Investigation (RI) 	MDEQ Acceptance of Final RI Report	<ul style="list-style-type: none"> PRPs² wish to use a presumptive remedy of capping with consolidation of outlying residual under a cap. They propose to complete delineation of residuals during the consolidation phase Detects of PCBs³ in groundwater have been reported. PRPs and MDEQ have not agreed on conceptual site hydrogeological setting PRPs wish to address groundwater issues with a long term monitoring well network installed after or during presumptive remedy Groundwater/surface water collection/ treatment system is in operation and issues related to operations after installation of the cap are unresolved between PRPs and MDEQ
OU 2 Willow Boulevard / A-Site	<ul style="list-style-type: none"> Remedial Investigation Human Health Risk Assessment (HHRA) Focused Feasibility Study (FFS) 	Completion and MDEQ Acceptance of RI/HHRA/FFS with Record of Decision (ROD) by US EPA	<ul style="list-style-type: none"> RI and FFS have been completed by PRPs and submitted to MDEQ as drafts. Substantial number of issues to be resolved prior to finalizing documents. MDEQ is in process of finalizing draft HHRA for US EPA review/concurrence. We have not received comments from EPA.
OU 3 King's Highway Landfill	<ul style="list-style-type: none"> Remedial Action – Final Closure Approval Long term monitoring 	None	<ul style="list-style-type: none"> OU is near completion of Remedial Action phase. No benefit to transition to US EPA at this time. PRPs will want assurance of EPA agreeing with protectiveness of completed remedy under CERCLA.
OU 4 12 th Street Landfill	<ul style="list-style-type: none"> ROD 	ROD	<ul style="list-style-type: none"> Issues related to remedial design and action are likely to require permits under State law. Remedial Action will likely be more expedient under US EPA Superfund permitting process. MDEQ AOC is specific to RI/FS tasks, a new AOC would be required for RD/RA.
OU 5 – 12 th Kalamazoo River and Portage Creek	<ul style="list-style-type: none"> RI HHRA Ecological Risk Assessment (Eco RA) Feasibility Study (FS) 	Various	<ul style="list-style-type: none"> MDEQ would like to finalize Baseline Risk Assessments prior to transition. MDEQ proposes to reject PRP prepared RI/FS with completion by MDEQ per terms AOC. However, MDEQ will defer to US EPA's decision on completion under their new consent order with the PRPs MDEQ would like to provide key technical support as discussed in Table 3.
Hawthorne Paper	<ul style="list-style-type: none"> Pre-RI 	Immediate	<ul style="list-style-type: none"> No significant work completed to date
King Mill Lagoons	<ul style="list-style-type: none"> RI 	Immediate	<ul style="list-style-type: none"> RI is not complete, PRP would like to proceed with a presumptive remedy of removal.
Georgia Pacific Five Former Lagoons	<ul style="list-style-type: none"> IRA complete 	None	<ul style="list-style-type: none"> Residuals removed, no further action required.

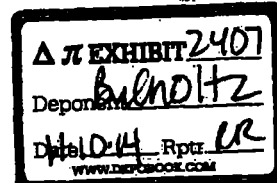
² Potentially responsible parties (PRPs)

³ Polychlorinated biphenyls (PCBs)

Table 3 – Ongoing Technical Support Activities

Activity	Description
• Long Term Monitoring	MDEQ developed a long term monitoring plan for the Kalamazoo River and Portage Creek to develop a baseline for water quality and data at key locations upstream and within the site. Maintenance of this program is viewed as critical to document the ongoing condition of the river system as various remedial activities are completed.
• Evaluation of sediment transport related to removal of MDNR owned dams	This work was initiated by MDEQ after refusal of the PRPs to adequately evaluate river maintenance and remediation costs with and without the dams in place.
• USGS river gage stations upstream of Plainwell Dam and downstream of Trowbridge Dam	MDEQ in consultation with USGS considers the installation and maintenance of these gage stations as critical to the ongoing monitoring of the river system until remedial actions are complete.
• Fluvial geomorphic determination of river bank stability and boundary of instream versus upland cleanup criteria	The analysis of bank stability is critical for the complete evaluation of the PRPs preferred remedial alternative of bank stabilization with natural attenuation. In addition, US EPA and MDEQ need to develop a mutual and scientifically supportable boundary for determination of instream and upland clean up criteria for remedial activities.
• US EPA Pilot Study – geo-spatial distribution of PCBs in the Plainwell and Otsego City Impoundments	MDEQ and US EPA are cooperating to determine if significant reductions in PRP volume estimates (and subsequent costs) can be made for equivalent risk tolerances.





SITE SPECIFIC AMENDMENT
TO THE
ENFORCEMENT AGREEMENT FOR STATE ENFORCEMENT LEAD SITES
IN MICHIGAN
FOR THE
ALLIED PAPER INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

I. INTRODUCTION

This Amendment establishes the roles and responsibilities of the U.S. Environmental Protection Agency - Region V (EPA) and the Michigan Department of Natural Resources (MDNR) at the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site. The MDNR, following concurrence by the EPA, is assuming a state enforcement lead at this site for the purposes of conducting the Remedial Investigation/Feasibility Study (RI/FS) at this site.

Unless otherwise stated in this Amendment, the terms and conditions of the original Superfund Memorandum of Agreement, dated December 26, 1989 will remain effective.

II. ROLES AND RESPONSIBILITIES

The MDNR State Project Manager (SPM) will provide the EPA Support Agency Coordinator (SAC) with one copy of all correspondence between the MDNR and the Potentially Responsible Parties (PRPs) for this site.

The SPM will provide the SAC with two copies of the major work products identified in Table I - Deliverables During the Allied Paper Inc./Portage Creek/Kalamazoo River RI/FS. The deliverables will be sent to EPA within five (5) days of receipt by the Department.

The EPA SAC agrees to provide the designated support agency review within the timeframe designated for that deliverable in Table I. These timeframes may be altered upon mutual agreement between the SPM and the SAC.

All agency activities for this site will be coordinated through the MDNR SPM. The EPA SAC shall contact the SPM before contacting the PRPs or any MDNR contractors for this site.

The MDNR SPM and the EPA SAC are designated in Table II - Agency Contacts. In the event that these contacts are not available, secondary contacts are also designated in this table.

III. CRITERIA FOR EPA INTERVENTION

Although this Amendment formalizes the roles of the MDNR and EPA with respect to MDNR as the lead enforcement agency at the Allied Paper Inc./Portage Creek/Kalamazoo River site, this lead designation may be switched at the request of the MDNR. Following discussion of such a request, and upon concurrence from EPA, the MDNR will either request that this site be

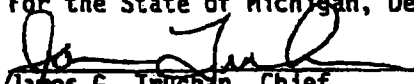
designated an EPA enforcement lead site, or the MDNR will prepare a site specific Cooperative Agreement for a state lead fund financed RI/FS or remedial design/remedial action (RD/RA). MDNR recognizes that should this shift in lead or funding occur, the remedial action at the site may be delayed.

IV. EXECUTION AND MODIFICATION

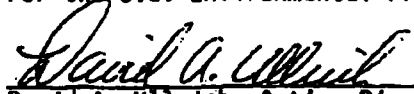
This amendment shall be reviewed on an annual basis by both the State Environmental Response Division Chief and the Region V, Director - Waste Management Division, or their designated representatives. This amendment shall be revised as necessary by mutual agreement of the two agencies.

Executed and Agreed to on January 23, 1991.

For the State of Michigan, Department of Natural Resources:


James G. Truchan, Chief
Environmental Response Division

For the U.S. Environmental Protection Agency - Region V:


David A. Ullrich, Acting Director
Waste Management Division

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TABLE I.
DELIVERABLES DURING THE
ALLIED PAPER INC./PORTAGE CREEK/KALAMAZOO RIVER RI/FS

Presented below is a list of the documents that will be provided, at a minimum, to the support agency (EPA). Also included in this table is the type of support agency review, and the timeframes for that review.

<u>Documents Provided by MDNR to EPA</u>	<u>Type of Support Agency Review</u>	<u>Timeframe (Calendar Days)</u>
1. Enforcement Document (Contract w/PRPs)	Information/Files	---
2. Initial Draft RI/FS Work plan(s)	Review/Comment	30 days
3. Final RI/FS Work Plan(s)	Review/Concur	14 days
4. Community Relations Plan	Review/Concur	14 days
5. Health and Safety Plan	Review/Acceptance	30 days
6. Pre-QAPP Meeting	Mutual Agreement	14 days Advance Notice
7. Quality Assurance Project Plan (QAPP)	Review/Concur (Subsequent drafts and minor revisions 15-days)	1st draft - 30 days
8. CLP Data Package	Data Review Comments	Within 30 Days of package receipt
9. Draft RI	Review/Comment	30 days
10. Final RI	Review/Concur	14 days
11. Alternatives Array/ ARAR's Meeting	Review/Comment Within 3 weeks	30 days
12. Preliminary Draft FS	Review/Comment	30 days
13. Agency Draft FS	Review/Comment	30 days
14. Agency Review Meetings (EPA Branch meeting, State Division mtg.)	Meetings (Support agency meeting first, alternate agency represented)	Within 45 days of Ag. Draft FS
15. Public Comment Draft FS	Review/Concur	14 days
16. Draft Proposed Plan (lead agency drafts plan, support agency has option to coauthor)	Review/Comment	21 days

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**Documents Provided
by NMNR to EPA**

**Type of Support
Agency Review**

**Timeframe
(Calendar Days)**

17. Final Proposed Plan

Review/Concur

5 Working Days

18. Draft ROD

Review/Comment

20 Days

19. Final ROD

Review/Concur

14 Days

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TABLE II
AGENCY CONTACTS

MDNR SPM

Scott Cornelius Department of Natural Resources Environmental Response Division Superfund Section P.O. Box 30028 Lansing, MI 48909	(517) 373-7367
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MDNR Secondary Contact

Sally Beebe Department of Natural Resources Environmental Response Division Superfund Section P.O. Box 30028 Lansing, MI 48909	(517) 373-4110
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EPA SAC

Terese Van Donsel MI/WI Section (5HS-11) U.S. EPA, Region V 230 S. Dearborn Street Chicago, IL 60604	(312) 353-6564
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EPA Secondary Contact

Mary Pat Tyson, Chief, Unit #2 MI/WI Section (5HS-11) U.S. EPA, Region V 230 S. Dearborn Street Chicago, IL 60604	(312) 886-3006
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U.S. ENVIRONMENTAL PROTECTION AGENCY EPA ASSISTANCE AGREEMENT/AMENDMENT PART I - ASSISTANCE NOTIFICATION INFORMATION				1. ASSISTANCE ID NO. Y995088-01		2. LOG NUMBER	
				3. DATE OF AWARD DEC 27 1990		4. MAILING DATE JAN 03 1991	
5. AGREEMENT TYPE				6. PAYMENT METHOD			
<input checked="" type="checkbox"/> Cooperative Agreement <input type="checkbox"/> Grant Agreement <input type="checkbox"/> Assistance Amendment				<input type="checkbox"/> Advance <input type="checkbox"/> Reimbursement <input checked="" type="checkbox"/> Letter of Credit 68-13-0519 Send Payment Request To:			
8. RECIPIENT				9. PAYEE			
Michigan Department of Natural Resources P.O. Box 30028 Lansing, Michigan 48909				Same as Block 8			
EIN NO. 38-6000134		CONGRESSIONAL DISTRICT 6th		10. RECIPIENT TYPE State			
11. PROJECT MANAGER AND TELEPHONE NO. Scott D. Cornelius (517) 373-7367 (Same address as Block 8)				12. CONSULTANT (WWT Construction Grants Only) N/A			
13. ISSUING OFFICE (City/State) Chicago, Illinois				14. EPA PROJECT/STATE OFFICER AND TELEPHONE NO. John Oaks (5HSM) (312) 886-0394 State Relations Unit, SPMB U.S. Environmental Protection Agency 230 South Dearborn Street Chicago, Illinois 60604			
15. EPA CONGRESSIONAL LIAISON & TEL. NO. Pat Gaskins (202) 382-5184		16. STATE APPL ID (Charinghouse)		17. FIELD OF SCIENCE N/A		18. PROJECT STEP (WWT CC Only) N/A	
19. STATUTORY AUTHORITY P.L. 96-510		20. REGULATORY AUTHORITY 40 CFR Parts 29, 30, 32, 33 and 35		21. STEP 2 + 3 & STEP 3 (WWT Construction Only)			
				a. Treatment Level			
				b. Project Type		N	
				c. Treatment Process		A	
				d. Sludge Design			
22. PROJECT TITLE AND DESCRIPTION State-Lead Cooperative Agreement to fund production of a Risk Assessment at the Allied Paper site in Kalamazoo, Michigan							
23. PROJECT LOCATION (Areas Impacted by Project)							
City/Place Kalamazoo, Michigan		County Allegan/Kalamazoo		State MI		Congressional District 3 & 4	
24. ASSISTANCE PROGRAM (CFDA Program No. & Title) 66.802 Superfund		25. PROJECT PERIOD 12/15/90		26. BUDGET PERIOD 03/15/92			
27. COMMUNITY POPULATION (WWT CC Only) N/A		28. TOTAL BUDGET PERIOD COST \$75,000		29. TOTAL PROJECT PERIOD COST \$75,000			
FUNDS		FORMER AWARD		THIS ACTION		AMENDED TOTAL	
30. EPA Amount This Action				\$75,000			
31. EPA In-Kind Amount							
32. Unexpended Prior Year Balance							
33. Other Federal Funds							
34. Recipient Contribution							
35. State Contribution							
36. Local Contribution							
37. Other Contribution							
38. Allowable Project Cost				\$75,000			
39. FISCAL	Program Element	FY	Appropriation	Doc. Control No.	Account Number	Object Class	Obligation/Deoblig. Amount
	TG-BY3A	91	68-20X8145	SK0004	ITGB05FB99B	41.85	\$75,000

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PART II-APPROVED BUDGET

ASSISTANCE IDENTIFICATION NO. V995088-01

TABLE A - OBJECT CLASS CATEGORY (Non-construction)	TOTAL APPROVED ALLOWABLE BUDGET PERIOD COST
1. PERSONNEL	\$ 9,719
2. FRINGE BENEFITS	2,916
3. TRAVEL	4,500
4. EQUIPMENT	-0-
5. SUPPLIES	187
6. CONTRACTUAL	55,000
7. CONSTRUCTION	-0-
8. OTHER	156
9. TOTAL DIRECT CHARGES	72,478
10. INDIRECT COSTS: RATE % BASE	2,522
11. TOTAL (Share: Recipient <u>0</u> % Federal <u>100</u> %)	\$75,000
12. TOTAL APPROVED ASSISTANCE AMOUNT	\$75,000
TABLE B - PROGRAM ELEMENT CLASSIFICATION (Non-construction)	
1.	
2.	
3.	
4.	
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6.	
7.	
8.	
9.	
10.	
11.	
12. TOTAL (Share: Recipient _____ % Federal _____ %)	
13. TOTAL APPROVED ASSISTANCE AMOUNT	\$
TABLE C - PROGRAM ELEMENT CLASSIFICATION (Construction)	
1. ADMINISTRATION EXPENSE	
2. PRELIMINARY EXPENSE	
3. LAND STRUCTURES, RIGHT-OF-WAY	
4. ARCHITECTURAL ENGINEERING BASIC FEES	
5. OTHER ARCHITECTURAL ENGINEERING FEES	
6. PROJECT INSPECTION FEES	
7. LAND DEVELOPMENT	
8. RELOCATION EXPENSES	
9. RELOCATION PAYMENTS TO INDIVIDUALS AND BUSINESSES	
10. DEMOLITION AND REMOVAL	
11. CONSTRUCTION AND PROJECT IMPROVEMENT	
12. EQUIPMENT	
13. MISCELLANEOUS	
14. TOTAL (Lines 1 thru 13)	
15. ESTIMATED INCOME (If applicable)	
16. NET PROJECT AMOUNT (Line 14 minus 15)	
17. LESS: INELIGIBLE EXCLUSIONS	
18. ADD: CONTINGENCIES	
19. TOTAL (Share: Recipient _____ % Federal _____ %)	
20. TOTAL APPROVED ASSISTANCE AMOUNT	\$

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A. GENERAL CONDITION

The recipient covenants and agrees that it will expeditiously initiate and timely complete the project work for which assistance has been awarded under this agreement, in accordance with all applicable provisions of 40 CFR Chapter I, Subchapter B. The recipient warrants, represents, and agrees that it, and all its contractors, employees and representatives, will comply with all applicable provisions of 40 CFR Chapter I, Subchapter B, INCLUDING BUT NOT LIMITED TO the provisions of 40 CFR 35 subpart O.

B. SPECIAL CONDITIONS

1. RECYCLED PAPER

Pursuant to EPA Order 1000.25, dated January 24, 1990, the recipient agrees to use recycled paper for all reports which are prepared as a part of this agreement and delivered to the Agency. This requirement does not apply to reports which are prepared on forms supplied by EPA. This requirement applies even when the cost of recycled paper is higher than that of virgin paper.

2. SMALL BUSINESS IN RURAL AREAS

By accepting this award, the recipient agrees to comply with Section 129 of Public Law 100-590, the Small Business Administration Reauthorization and Amendment Act of 1988. Therefore, if the recipient awards a contract under this assistance agreement, it will utilize the following affirmative steps relative to Small Business in Rural Areas (SBRAs):

- a. Placing SBRAs on solicitation lists;
- b. Ensuring that SBRAs are solicited whenever they are potential sources;
- c. Dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation by SBRAs;
- d. Establishing delivery schedules, where the requirements of work will permit, which would encourage participation by SBRAs;
- e. Using the services of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce, as appropriate; and
- f. Requiring the contractor, if it awards subcontracts, to take the affirmative steps in subparagraphs a. through e. of this condition.

3. DRUG-FREE WORKPLACE

In accordance with the Drug-Free Workplace Act of 1988 (Federal Register, 1/31/89, P4946) and EPA's implementing regulation of 40 CFR Part 32, Subpart F, Appendix C, the recipient certifies that it will provide a drug-free workplace by:

- a. publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of controlled substances is prohibited in the recipient's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

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- b. establishing a drug-free awareness program to inform employees about--
 - (1) the dangers of drug abuse in the workplace;
 - (2) the recipient's policy of maintaining a drug-free workplace;
 - (3) any available drug counseling, rehabilitation, and employee assistance programs; and
 - (4) the penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;
- c. making it a requirement that each employee to be engaged in the performance of the project be given a copy of the statement required by paragraph a.;
- d. notifying the employee in the statement required by paragraph a. that, as a condition of employment under the award, the employee will--
 - (1) abide by the terms of the statement; and
 - (2) notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;
- e. notifying the Award Official in writing within ten calendar days after receiving notice under subparagraph d (2) from an employee or otherwise receiving actual notice of such conviction;
- f. taking one of the following actions, within 30 calendar days of receiving notice under subparagraph d (2), with respect to any employee who is so convicted--
 - (1) taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
 - (2) requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;
- g. making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs a, b, c, d, e and f.

The recipient shall insert in the space provided below the site(s) for performance of work done in connection with the specific award. Place of Performance (street address, city, county, State, and zip code).

4. MINORITY BUSINESS ENTERPRISE/WOMEN'S BUSINESS ENTERPRISE

The recipient agrees to submit to the award official a completed Standard Form 334 within 15 days after the end of each Federal fiscal quarter during which the recipient or its contractors award any subagreements to minority or women's businesses. Negative reports are also required.

5. ANTI-LOBBYING

By accepting this award, the recipient certifies that it will comply with the new Anti-Lobbying Act, Public Law 101-121, Section 319, and the OMB Interim Final Guidance, the "Governmentwide Guidance for New Restrictions on Lobbying", dated December 18, 1989.

Therefore, the recipient, by accepting this award, certifies to the best of his or her knowledge and belief, that:

- a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, Disclosure Form to Report Lobbying, in accordance with its instructions.
- c. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

Approved by Oa-
0348-0046

1. Type of Federal Action: <input type="checkbox"/> a. contract <input type="checkbox"/> b. grant <input type="checkbox"/> c. cooperative agreement <input type="checkbox"/> d. loan <input type="checkbox"/> e. loan guarantee <input type="checkbox"/> f. loan insurance		2. Status of Federal Action: <input type="checkbox"/> a. bid/offered/application <input type="checkbox"/> b. initial award <input type="checkbox"/> c. post-award		3. Report Type: <input type="checkbox"/> a. initial filing <input type="checkbox"/> b. material change For Material Change Only: year _____ quarter _____ date of last report _____	
4. Name and Address of Reporting Entity: <input type="checkbox"/> Prime <input type="checkbox"/> Subawardee Tier _____, if known: Congressional District, if known: _____			5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime: Congressional District, if known: _____		
6. Federal Department/Agency:			7. Federal Program Name/Description: CFDA Number, if applicable: _____		
8. Federal Action Number, if known:			9. Award Amount, if known: \$ _____		
10. a. Name and Address of Lobbying Entity (if individual, last name, first name, MI):			b. Individuals Performing Services (including address if different from No. 10a) (last name, first name, MI):		
(attach Continuation Sheet(s) SF-LLL-A, if necessary)					
11. Amount of Payment (check all that apply): \$ _____ <input type="checkbox"/> actual <input type="checkbox"/> planned			13. Type of Payment (check all that apply): <input type="checkbox"/> a. retainer <input type="checkbox"/> b. one-time fee <input type="checkbox"/> c. commission <input type="checkbox"/> d. contingent fee <input type="checkbox"/> e. deferred <input type="checkbox"/> f. other; specify: _____		
12. Form of Payment (check all that apply): <input type="checkbox"/> a. cash <input type="checkbox"/> b. in-kind; specify: nature _____ value _____					
14. Brief Description of Services Performed or to be Performed and Date(s) of Service, including officer(s), employee(s), or Member(s) contacted, for Payment Indicated in Item 11: (attach Continuation Sheet(s) SF-LLL-A, if necessary)					
15. Continuation Sheet(s) SF-LLL-A attached: <input type="checkbox"/> Yes <input type="checkbox"/> No					
16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.			Signature: _____ Print Name: _____ Title: _____ Telephone No.: _____ Date: _____		

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INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.
4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee", then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-99-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.
(b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.
15. Check whether or not a SF-LLL-A Continuation Sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0346-0046), Washington, D.C. 20503.

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b. SPECIAL CONDITIONS (Continued)

PART IV

NOTE: The Agreement must be completed in duplicate and the Original returned to the Grants Administration Division for Headquarters awards and to the appropriate Grants Administrations Office for State and local awards within 3 calendar weeks after receipt or within any extension of time as may be granted by EPA.

Receipt of a written refusal or failure to return the properly executed document within the prescribed time, may result in the withdrawal of the offer by the Agency. Any change to the Agreement by the recipient subsequent to the document being signed by the EPA Award Official which the Award Official determines to materially alter the Agreement shall void the Agreement.

OFFER AND ACCEPTANCE

The United States of America, acting by and through the U.S. Environmental Protection Agency (EPA), hereby offers assistance/amendment to the Michigan Department of Natural Resources

for 100% of all approved costs incurred up to and not exceeding \$ 75,000

for the support of approved budget period effort described in application (including all application modifications)

MDNR Application for Allied Paper site dated December 13, 1990 included herein by reference.

ISSUING OFFICE (Grants Administration Office)	AWARD APPROVAL OFFICE
ORGANIZATION/ADDRESS Contracts and Grants Branch (5MCG) U.S. Environmental Protection Agency 230 South Dearborn Street Chicago, Illinois 60604	ORGANIZATION/ADDRESS Waste Management Division (5HSM) U.S. Environmental Protection Agency 230 South Dearborn Street Chicago, Illinois 60604

THE UNITED STATES OF AMERICA BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY		
SIGNATURE OF AWARD OFFICIAL <i>Robert Springer</i>	TYPED NAME AND TITLE Valdas V. Adamkus, Regional Administrator	DATE DEC 27 1990

This Agreement is subject to applicable U.S. Environmental Protection Agency statutory provisions and assistance regulations. In accepting this award or amendment and any payments made pursuant thereto, (1) the undersigned represents that he is duly authorized to act on behalf of the recipient organization, and (2) the recipient agrees (a) that the award is subject to the applicable provisions of 40 CFR Chapter I, Subchapter B and of the provisions of this agreement (Parts I thru IV), and (b) that acceptance of any payments constitutes an agreement by the payee that the accounts, if any found by EPA to have been overpaid will be refunded or credited in full to EPA.

BY AND ON BEHALF OF THE DESIGNATED RECIPIENT ORGANIZATION		
SIGNATURE <i>D. Rector</i>	TYPED NAME AND TITLE Delbert Rector, Deputy Director	DATE 1/18/91

APPLICATION FOR
FEDERAL ASSISTANCE

1. TYPE OF SUBMISSION: Application <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Construction Preapplication <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction		2. DATE SUBMITTED	Applicant Identifier																					
		3. DATE RECEIVED BY STATE	State Application Identifier																					
		4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier																					
5. APPLICANT INFORMATION																								
Legal Name: Michigan Department of Natural Resources		Organizational Unit: Environmental Response Division																						
Address (give city, county, state, and zip code): P.O. Box 30028 Ingham County Lansing, MI 48909		Name and telephone number of the person to be contacted on matters involving this application (give area code): Scott D. Cornelius (technical) 517-373-7367 Donna Holey (fiscal) 517-373-1750																						
6. EMPLOYER IDENTIFICATION NUMBER (EIN): <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 3 8 — 6 0 0 0 1 3 4 </div>		7. TYPE OF APPLICANT: (enter appropriate letter in box) A A. State H. Independent School Dist. B. County I. State Controlled Institution of Higher Learning C. Municipal J. Private University D. Township K. Indian Tribe E. Interstate L. Individual F. Intermunicipal M. Profit Organization G. Special District N. Other (Specify) _____																						
8. TYPE OF APPLICATION: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision B. Revision, enter appropriate letter(s) in box(es): <input type="checkbox"/> <input type="checkbox"/> A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (specify): _____		9. NAME OF FEDERAL AGENCY: U.S. EPA, Region V, Chicago, IL - 60604																						
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 6 6 — 8 0 2 </div> TITLE: Superfund		11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Endangerment/Risk Assessment for Allied Paper/Portage Creek/ Kalamazoo River site (State lead enforcement)																						
12. AREAS AFFECTED BY PROJECT (city, county, states, etc.): Allegan/Kalamazoo Counties																								
12. PROPOSED PROJECT: Start Date: 12/15/90 Ending Date: 3/15/92		14. CONGRESSIONAL DISTRICTS OF: a. Applicant: Sixth District b. Project: Third & Fourth Districts																						
13. ESTIMATED FUNDING: <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>a. Federal</td> <td>\$</td> <td style="text-align: right;">75,000 .00</td> </tr> <tr> <td>b. Applicant</td> <td>\$</td> <td style="text-align: right;">.00</td> </tr> <tr> <td>c. State</td> <td>\$</td> <td style="text-align: right;">.00</td> </tr> <tr> <td>d. Local</td> <td>\$</td> <td style="text-align: right;">.00</td> </tr> <tr> <td>e. Other</td> <td>\$</td> <td style="text-align: right;">.00</td> </tr> <tr> <td>f. Program Income</td> <td>\$</td> <td style="text-align: right;">.00</td> </tr> <tr> <td>g. TOTAL</td> <td>\$</td> <td style="text-align: right;">75,000 .00</td> </tr> </table>		a. Federal	\$	75,000 .00	b. Applicant	\$.00	c. State	\$.00	d. Local	\$.00	e. Other	\$.00	f. Program Income	\$.00	g. TOTAL	\$	75,000 .00	15. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS? a. YES THIS PREAPPLICATION APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON: DATE <u>12/11/90</u> b. NO. <input type="checkbox"/> PROGRAM IS NOT COVERED BY E.O. 12372 <input type="checkbox"/> OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW	
a. Federal	\$	75,000 .00																						
b. Applicant	\$.00																						
c. State	\$.00																						
d. Local	\$.00																						
e. Other	\$.00																						
f. Program Income	\$.00																						
g. TOTAL	\$	75,000 .00																						
16. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT? <input type="checkbox"/> Yes If "Yes," attach an explanation. <input checked="" type="checkbox"/> No		17. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN ONLY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED																						
a. Typed Name of Authorized Representative Delbert Rector		b. Title Deputy Director	c. Telephone Number 517-373-7917																					
d. Signature of Authorized Representative		e. Date Signed																						

Previous Editions Not Usable

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WY021831

BUDGET INFORMATION - In-Construction Programs

U.S. Department of Housing and Urban Development

104

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Superfund	66-802	\$	\$	\$ 75,000	\$	\$ 75,000
2.						
3.						
4.						
5. TOTALS		\$	\$	\$ 75,000	\$	\$ 75,000

SECTION B - BUDGET CATEGORIES

Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
a. Personnel	\$ 9,719	\$	\$	\$	\$
b. Fringe Benefits	2,916				
c. Travel	4,500				
d. Equipment	-0-				
e. Supplies	187				
f. Contractual	55,000				
g. Construction	-0-				
h. Other	156				
i. Total Direct Charges (sum of 6a - 6h)	72,478				
j. Indirect Charges	2,522				
k. TOTALS (sum of 6i and 6j)	\$ 75,000	\$	\$	\$	\$
Program Income	\$	\$	\$	\$	\$

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WD-2838

10/17/1987

SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8.	\$	\$	\$	\$
9.				
10.				
11.				
12. TOTALS (sum of lines 8 and 11)	\$	\$	\$	\$

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$	\$	\$	\$	\$
14. Non-Federal					
15. TOTAL (sum of lines 13 and 14)	\$	\$	\$	\$	\$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	(b) Total Number of Months			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	\$	\$	\$	\$
17.				
18.				
19.				
20. TOTALS (sum of lines 16 - 19)	\$	\$	\$	\$

SECTION F - OTHER BUDGET INFORMATION (Attach additional sheets if necessary)	
Direct Charges: See attached budget detail	22. Indirect Charges: 19.967% of personnel & fringes
Remarks: See attached narrative	

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SF 121A (1-68) Page 2
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WY021833

W042838

ASSURANCES — NON-CONSTRUCTION PROGRAMS

Note: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States, and if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§ 4728-4763) relating to prescribed standards for merit systems for programs funded under one of the nineteen statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§ 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§ 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. § 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.
7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
8. Will comply with the provisions of the Hatch Act (5 U.S.C. §§ 1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.
9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§ 276a to 276a-7), the Copeland Act (40 U.S.C. § 276c and 18 U.S.C. §§ 874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 327-333), regarding labor standards for federally assisted construction subagreements.

Standard Form 4700 11-881
Prescribed by GSA Circular 4-102

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10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§ 1451 et seq.); (f) conformity of Federal actions to State (Clear Air) Implementation Plans under Section 176(c) of the Clear Air Act of 1955, as amended (42 U.S.C. § 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended, (P.L. 93-523); and (h) protection of endangered species under the Endangered Species Act of 1973, as amended, (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§ 1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. 2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§ 4801 et seq.) which prohibits the use of lead based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act of 1984.

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE Deputy Director	
APPLICANT ORGANIZATION Michigan Department of Natural Resources		DATE SUBMITTED

W042841

WY021835

Note: The Program Narrative begins on page 9.

COOPERATIVE AGREEMENT ASSURANCES

The State makes the following additional assurances attached as items 1 through 26 of this application and with the intention that each assurance be incorporated into any subsequent cooperative agreement amendment.

1. Procurement Standards

This Agreement is subject to the procurement standards of Title 40 of the Code of Federal Regulations Part 35, Subpart 0.

2. Letter of Credit

In accepting this Cooperative Agreement, the recipient agrees to the following conditions for the letter of credit method of financing:

- a.) Cash drawdowns will occur only when needed for disbursements.
- b.) Timely reporting of cash disbursements and balances will be provided, as required by the EPA Letter of Credit Users Manual.
- c.) The same standards of timing and reporting will be imposed on secondary recipients, if any.
- d.) When a drawdown under the letter of credit occurs, the recipient will show on the voucher (Form TFC5-5805) the Cooperative Agreement number, the appropriate EPA account number, and the drawdown amount applicable to each site/activity account (see attached "Instructions for Using the Superfund Account Number Under Cooperative Agreements"). The eighth digit of the account number (see Item 39, page 1 of the Cooperative Agreement) is the code to the appropriate activity assignment:
 - B - Pre-Enforcement (negotiations)
 - J - Pre-Remedial Activities
 - L - Remedial Investigation/Feasibility Study
 - M - Feasibility Study
 - N - Remedial Design
 - P - Oversight of Responsible Party
 - R - Remedial Action
 - S - Operation and Maintenance.
 - 7 - General Support and Maintenance
- e.) When funds for a specific activity have been exhausted but the work under the activity has not been completed, the recipient may not draw down from another activity or site account without written permission from the EPA Award Official.
- f.) Funds remaining in an account after completion of an activity may be either returned to EPA or adjusted to another activity or site, at EPA's discretion.

COOPERATIVE AGREEMENT ASSURANCES, continued

2. Letter of Credit, continued

- g.) When an activity is completed, the recipient will submit a Financial Status Report (Standard Form 269) within 90 days to the EPA Award Official.
- h.) Superfund recipients also must submit the SF 269 within 90 days after the close of each budget period. If the budget period is longer than one year the report must be submitted annually, based on the anniversary date of the award.

Failure on the part of the recipient to comply with the above conditions may cause the unobligated portions of the letter of credit to be revoked and the financing method changed to a reimbursable basis.

3. Prompt Payment Act Provisions

In accordance with section 2(d) of the Prompt Payment Act (PL 97-177), Federal funds may not be used by the recipient for the payment of interest penalties to contractors when bills are paid late, nor may interest penalties be used to satisfy cost-sharing requirements. Obligations to pay such interest penalties will not be obligations of the United States.

4. Lobbying

No portion of this award may be used for lobbying or propaganda purposes as prohibited by 18 USC section 1913 or by section 607 (a) of Public Law 96-74.

5. MRE/WBE

The recipient agrees to submit to the EPA Award Official a completed EPA Form 6005-1 within fifteen (15) days after the end of each Federal fiscal quarter. Reporting must continue for each Federal fiscal quarter thereafter until award of the last subagreement for the activities or tasks identified in the Cooperative Agreement.

6. Fund Balancing

CERCLA section 104(c)(4) and 121 requires that CERCLA-funded actions provide a cost-effective response, and, in certain circumstances specified in 121(d)(4)(F), balancing the need for protection of public health, welfare, and the environment against the availability of amounts from the fund to respond at other sites. If the State requests additional fund-financed response at the site, EPA will evaluate the request against available fund monies to determine whether it is appropriate. This Cooperative Agreement does not commit EPA to future funding for response actions at the site.

COOPERATIVE AGREEMENT ASSURANCES, continued

7. NCP

All activities conducted under this Cooperative Agreement shall be consistent with the National Contingency Plan (NCP), 40 CFR Part 300. Remedial alternatives developed as part of any remedial investigation and feasibility study funded under this Agreement will be identified, evaluated, and ultimately categorized as source control or management of migration measures based upon the factors established in the NCP.

8. Project Reviews

The EPA Remedial Project Manager or his/her designee will conduct periodic reviews and visits to evaluate project activities to assure compliance with applicable EPA requirements and regulations. The State Project Manager agrees to ensure that schedules and reporting requirements are met or that any changes are agreed to by EPA. All State-proposed modifications to schedules or activities will be reported to the EPA Cooperative Agreement Project Officer for review and concurrence. The EPA Cooperative Agreement Project Officer agrees to notify the State Project Coordinator of schedule changes resulting from EPA enforcement activities.

9. Site Access and Permits

The State assures that to the extent of its authority it will assume the responsibility for undertaking formal or informal actions necessary to satisfy all Federal, State, and local requirements, including permits and approvals, necessary for implementing activities addressed in this Cooperative Agreement. The State assures that to the extent of its authority it will assume responsibility for undertaking formal or informal actions necessary to provide access to the site as well as all rights-of-way and easements necessary to complete the response actions. The State will to the extent of its authority seek to provide for access to the site for EPA employees and contractors at all reasonable times. EPA agrees to the extent of its authority to assist the State in securing access when necessary. The State may not approve any compensation to property owners from Federal funds provided under this Cooperative Agreement without EPA approval.

10. Community Relations

The State and EPA agree that community relations activities at the site will be conducted in accordance with the community relations plan to be prepared according to the Statement of Work contained in the State's application. In implementing its plan, the State agrees to comply with all relevant EPA policy and guidance on community relations programs and procedures.

COOPERATIVE AGREEMENT ASSURANCES, continued

11. Site Safety Plan

A final safety plan shall be prepared for field activities performed at this site and shall be submitted to the EPA Cooperative Agreement Project Officer for review prior to implementation. The plan shall be consistent with the requirements of the National Contingency Plan, applicable Federal safety standards and guidance identified by EPA, and applicable State safety standards and guidance. Each subagreement awarded under this Agreement must contain a condition that requires contractors and subcontractors to comply with the approved safety plan and all relevant Federal health and safety standards. No field work at a site shall occur until a safety plan for that site has been reviewed by EPA, for consistency with EPA requirements, and the State and is finalized.

12. Access to Site Files and Confidentiality

At U.S. EPA's request, and in accordance with State law, the State shall make available any information in its possession concerning the site. If said information was submitted by the State under a claim of confidentiality, said information shall be treated in accordance with 40 CFR Part 2. Absent such a claim, U.S. EPA may make said information available to the public without further notice. At the State's request and in accordance with Federal law, U.S. EPA agrees to share information and reports developed as part of its responsibilities under this Contract. The State agrees not to release any information which the U.S. EPA requests be withheld. In making such a request, the U.S. EPA shall identify the basis on which such information is exempt from disclosure under the Federal Freedom of Information Act. Moreover, the U.S. EPA agrees to provide the State with reasonable and necessary support (e.g. witnesses or affidavits) that the State may need to defend against a challenge to the withholding of such information.

13. Reporting

The State agrees to submit progress reports to the EPA Cooperative Agreement Project Officer within forty-five (45) days of the end of each Federal fiscal quarter. These reports shall include information specific in 40 CFR part 35 Subpart 0, Section 35.6650 and Section 35.6655.

14. Submission of Technical and Procurement Documents

The State agrees to submit all plans, reports, specifications, and/or recommendations to the EPA Cooperative Agreement Project Officer for review and concurrence, prior to issuance or implementation, to ensure technical adequacy and consistency with the scope of work of this Agreement. Final subagreement project assignments and work plans and subagreement project assignment modifications shall be submitted to the EPA Cooperative Agreement Project Officer prior to issuance for review to ensure compliance with the terms of this Agreement.

COOPERATIVE AGREEMENT ASSURANCES, continued

15. CERCLA Health-Related Activities

The State agrees that no human subject testing or health effects analyses may be funded under this Agreement. Any CERCLA health-related activities must be coordinated with the United States Department of Health and Human Services, pursuant to sections 104(b) and 104(i) of CERCLA.

16. Exclusion of Third Party Benefits

This Agreement is intended to benefit only the State and EPA. It extends no benefit or rights to any party not a signatory to this Agreement. In addition, EPA does not assume any liability to third parties with respect to losses due to bodily injury or property damages that exceed the limitations contained in the provisions of 28 U.S.C. sections 1346(b), 2671-2680. To the extent permitted by State law, the State does not assume liability to any third parties with respect to losses due to bodily injury or property damage.

17. Responsible Party Activities

If, during the period of performance for this Agreement, responsible parties agree to perform, or to pay for the performance of, any work elements included in the statement of work (SOW) for this Agreement, EPA and the State agree to negotiate jointly any necessary modifications to this Agreement. If appropriate, this Agreement may be amended to adjust the State's letter of credit and the project SOW accordingly.

Should the state enter into any agreement with any PRPs for the performance of an RI/FS, the State shall reserve for itself the performance of any endangerment/risk assessment associated with that work.

18. Contractor Conflict of Interest

EPA has determined that participation in a response action at a site by a contractor that is a potentially responsible party (PRP) or works for a PRP at the site could create an organizational conflict of interest (i.e., the contractor would be placed in a position where its interests would conflict with its ability to perform the work properly or would otherwise adversely affect State or Federal enforcement action). Therefore, the State shall require each bidder or offeror on any subagreement funded under this Cooperative Agreement to provide, with its bid or proposal:

- a.) Information on its status and the status of parent companies, subsidiaries, affiliates, subcontractors, and current clients as PRPs at the site.

COOPERATIVE AGREEMENT ASSURANCES, continued

18. Contractor Conflict of Interest, continued

b.) Certification that, to the best of its knowledge and belief, it has disclosed such information or no such information exists.

c.) A statement that it immediately shall disclose any such information discovered after submission of its bid or proposal, or after award.

The State shall evaluate such information and shall exclude any bidder or offeror whose conflict of interest is significant and cannot be avoided or otherwise resolved.

19. Subagreement Conflict of Interest and Technical Support for Enforcement Activities

The State shall include the following, or equivalent, clauses in each subagreement for services or construction awarded under this Cooperative Agreement:

a.) The contractor shall not provide data generated or otherwise obtained in the performance of its responsibilities under this contract to any party other than State and Federal agencies and their authorized agents.

b.) The contractor shall not accept employment from any party other than State or Federal agencies for work directly related to the site(s) covered under this contract for a period of three years from termination of the contract, or until any litigation related to the site(s) is completed, whichever is longer, unless it has received a written release from this restriction from the contracting State agency, including an EPA concurrence.

c.) The contractor, upon request, shall provide witnesses and documentation of activities performed and costs incurred under this contract to State and Federal agencies during the period of performance and for three years from termination of the contract, or until any litigation related to the site(s) is completed, whichever is longer. The contractor shall be entitled to reasonable compensation for any such activities performed.

20. Emergency Response Actions During a Remedial Project

Any emergency response activities conducted pursuant to the National Contingency Plan, 40 CFR section 300.65, shall not be restricted by the terms of this Agreement. EPA and the State may jointly suspend or modify the remedial activities in the SOW in this Agreement during and subsequent to necessary emergency response actions.

COOPERATIVE AGREEMENT ASSURANCES, continued

21. Negation of Agency Relationship

Nothing contained in this Agreement shall be construed to create, either expressly or by implication, the relationship of agency between EPA and the State. Any standards, procedures, or protocols prescribed in this Agreement to be followed by the State during the performance of its obligations under this Agreement are to assure the quality of the final product of the actions contemplated by this Agreement, and do not constitute a right to control the actions of the State. EPA (including its employees and contractors) is not authorized to represent or act on behalf of the State in any matter relating to this Agreement, and the State (including its employees and contractors) is not authorized to represent or act on behalf of EPA in any matter related to this Agreement. Neither EPA nor the State shall be liable for the contracts, acts, errors, or omissions of the agents, employees, or contractors of the other party entered into, committed, or performed with respect to or in the performance of, this Agreement.

22. Notice of Intent to Settle or Initiate Proceedings

EPA and the state agree that, with respect to the claims that each may be entitled to assert against any third person (herein called the "responsible party," whether one or more) for reimbursement of any services, materials, monies, or other thing of value expended by EPA or the State for response activity at the site(s) described herein, neither EPA nor the State will enter into a settlement with, or initiate a judicial or administrative proceeding against, a responsible party for the recovery of such sums except after having given notice in writing to the other party to this Agreement not less than thirty (30) days in advance of the date of the proposed settlement or commencement of the proposed judicial or administrative proceedings. Neither party to this Agreement shall attempt to negotiate for nor collect reimbursement of any response costs on behalf of the other party, and authority to do so is hereby expressly negated and denied.

23. Cooperation and Coordination in Cost Recovery Efforts

EPA and the State agree that they will cooperate and coordinate in efforts to recover their respective costs of response actions taken at the site described herein, including the negotiation of settlement and the filing and management of any judicial actions against potential third parties. This shall include coordination in the use of evidence and witnesses available to each in the preparation and presentation of any cost recovery action, excepting any documents or information which may be confidential under the provisions of any applicable State or Federal law or regulation.

COOPERATIVE AGREEMENT ASSURANCES, continued

24. Judicial Action in U.S. District Court

EPA and the State agree that judicial action taken by either party against a potentially responsible party pursuant to CERCLA for recovery of any sums expended in response actions at the site described herein shall be filed in the United States District Court for the judicial district in which the site described in this Agreement is located, or in such other judicial district of the United States District Court as may be authorized by section 113 of CERCLA, and agreed to in writing by the parties of this Agreement.

25. Litigation Under CERCLA Sections 106 and 107

The award of this Agreement does not constitute a waiver of EPA's rights to bring an action against any person or persons for liability under sections 106 or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or any other statutory provisions or common law.

26. In accepting this Cooperative Agreement, the recipient agrees to the following conditions:

- a. The State's pending lawsuit, Kelly v. Allied Paper, et. al. No. L87-89-CAS filed December 7, 1987, shall not in any way relieve the State of its obligation to comply with the CERCLA administrative process for selection of a response action(s) for this site. These obligations include, without limitation, compliance with the provisions of this agreement and the provisions of 40 C.F.R. 300.515 (d) and (e) for selection of remedial action(s) at the site. In addition, the State will not publish a proposed plan that U.S. EPA has not approved. As a term of this cooperative agreement, the State agrees to continue to use its best efforts to stay the pending lawsuit, referred to above, as it affects the remedial action and its selection, and to continue to use the administrative process provided by the statute.

26. In accepting this Cooperative Agreement, the recipient agrees to the following conditions, continued

- b. The State agrees not to rely on a RI/FS, or otherwise implement, any CERCLA response actions based on a RI/FS that has not received the concurrence of the EPA.

Failure on the part of the recipient to comply with the above conditions may require the state to forfeit all further federal funds and to repay all federal funds used to complete the RI/FS, or portions thereof, which did not receive EPA's concurrence.

PROGRAM NARRATIVE

ALLIED PAPER INC./PORTAGE CREEK/KALAMAZOO RIVER site
KALAMAZOO AND ALLEGAN COUNTIES

OVERVIEW

This request for a new state lead enforcement cooperative agreement is to fund an Endangerment/Risk Assessment for the Allied Paper Inc./Portage Creek/Kalamazoo River site. The overall purpose of the Endangerment/Risk Assessment process is to identify and characterize immediate and potential risks to public health and the environment associated with release and exposure of contaminants. The assessment will integrate information on the toxicity of identified contaminants with estimates of exposure to quantify risk, which in turn will provide justification necessary for remedial actions.

BACKGROUND

On August 30, 1990, the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site was officially included on the National Priority List (NPL) pursuant to the Comprehensive Environmental Response, Liability and Compensation Act (CERCLA). This site includes Portage Creek, from Cork Street just above the Bryant Mill Pond, in the City of Kalamazoo Michigan, to its confluence with the Kalamazoo River and the Kalamazoo River from this confluence downstream to the Allegan City Dam. In total this site includes about a 3-mile stretch of Portage Creek and a 35-mile stretch of the Kalamazoo River.

The sediments, soils, water column and biota within this site are contaminated with polychlorinated biphenyls (PCBs), a hazardous substance and probable human carcinogen. This site contains about 200,000 pounds of PCB in the sediments. The PCBs continue to migrate off-site due to the river flow, and substantially contribute to the on-going contamination to the water column, biota and Lake Michigan. As a direct result of this contamination the Michigan Department of Public Health (MDPH) has issued a fish consumption advisory (1990) for this site. This warning has been reissued annually since 1977.

The State has identified three parties who are potentially responsible for the contamination of this site. These potentially responsible parties (PRPs) include HM Holdings Inc./Allied Paper Company, Georgia Pacific Corporation and Simpson (Plainwell) Paper Company. The MDNR has conducted negotiations with all three PRPs. The negotiations have produced an agreement for the PRPs to conduct and fund the entire Remedial Investigation/Feasibility Study on this site.

STATEMENT OF WORK
ENDANGERMENT/RISK ASSESSMENT

GENERAL DESCRIPTION

The assessment process is multi-faceted and governed to a large extent by site-dependent conditions. The assessment process can be divided into five components, as follow:

- *Selection of contaminants
- *Exposure assessment
- *Toxicity assessment
- *Risk characterization
- *Endangerment/Risk Assessment Technical Memorandum

Included in the assessment will be an evaluation and transformation of site-specific demographic, physical, chemical and biologic factors into qualitative and/or quantitative interpretations of actual or potential harm associated with the site. Among the parameters to be considered in the assessment process for this site are:

- *intrinsic toxicity of identified contaminants and the relevant media (e.g., water, air, soil) in which they occur;
- *medium-specific fate of the contaminants within the environment including assessments of relative release and degradation processes (i.e., physical, chemical, biological properties);
- *analysis of the potential pathways and extent of exposure;
- *determination of human and environmental populations at risk;
- *the probability and extent to which a threat exists; and
- *evaluation of estimated risk by comparison with appropriate standards.

The assessment will be prepared in accordance with EPA guidance: Risk Assessment Guidance for Superfund (Volumes I and II); December 1989.

STATEMENT OF WORK, cont.
ENDANGERMENT/RISK ASSESSMENT

ASSESSMENT TASKS

1. Selection of Contaminants.....estimated cost \$10,000

The aim of contaminant selection is to identify a limited number of substances from the total possible contaminants to arrive at a representative group of high risk substances for subsequent characterization. This will be accomplished by screening initial sample information and selecting substances based on factors which may influence potential risk, such as concentration at the site, potential critical exposure pathways and the intrinsic toxicity of the compound. To date, preliminary RI findings suggest that PCB's will be the major contaminant of concern. However, all of the contaminants found at the site will be evaluated to result in the selection of "indicator chemicals" which encompass the relevant physiochemical and toxicological properties of the contaminants present. These "indicator chemicals" will be subjected to the analyses outlined in the following tasks.

2. Exposure Assessment.....estimated cost \$20,000

The aim of this component of the EA process is to estimate exposure levels using a process which identifies and integrates actual and potential exposure pathways with potentially exposed human and environmental populations. This will be accomplished by determining the mechanism of substance release into the environment, including estimating the potential release rate of the chemical from its source. Second, the environmental fate of the substance will be evaluated. In this step, environmental transport (e.g., groundwater migration), transformation (e.g., biodegradation) and transfer (e.g., volatilization) processes are considered. Finally, potential exposed populations will be identified and the uptake and absorption of the substances will be calculated to determine expected exposure levels.

3. Toxicity Assessment.....estimated cost \$20,000

Existing literature will be reviewed and the toxic effects of the substances will be evaluated to determine the nature and extent of the hazards associated with exposure. A qualitative description of the toxic effects, as well as quantitative data such as no-effect levels and established acceptable levels, will be generated to provide toxicity profiles for each substance.

STATEMENT OF WORK, cont.
ENDANGERMENT/RISK ASSESSMENT

ASSESSMENT TASKS, cont.

4. Risk Characterization.....estimated cost \$20,000

Characterization of risk requires integrating information developed during the exposure and toxicity assessments to yield characterization of actual or potential risks. Exposure levels from the various pathways will be compared with "acceptable levels" defined by regulatory legislation and guidelines to determine if the substances pose a risk. The risk characterization will address several types of actual and potential risks, including carcinogenic risks and non-carcinogenic risks. Discussions will be held between MDNR and U.S. EPA to determine the acceptable methodologies used during this characterization.

5. Endangerment/Risk Assessment Technical Memorandum.estimated cost \$ 5,000

A technical memorandum will be prepared which will determine and document the probability and magnitude of actual or potential harm to public health, welfare or the environment as determined by the description of current situation and the proposed response. This assessment will be based on results of the investigation and subsequent evaluations of the data and will consider hazardous substances and/or waste present in all relevant pathways, environmental fate and transport mechanisms, intrinsic toxicological properties or human health standards and criteria, exposure pathways and probability of sensitive populations being exposed, population at risk, and characterization of risk or harm.

TASK SCHEDULE

<u>ACTIVITY</u>	<u>OUTPUT</u>	<u>TARGET</u> <u>INITIATION</u> After Award (Month-Day)	<u>TARGET</u> <u>COMPLETION</u> After Award (Month-Day)	<u>EST.</u> <u>COST</u>
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Note: The target dates for initiation and completion as well as the schedule will be determined by the interrelationship of the PRPs and MDNR as well as the Work Plan submittal.

ALLIED/PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
ENDANGERMENT/RISK ASSESSMENT

BUDGET DETAIL

Personnel:

<u>FTE</u>	<u>Class and Level</u>	<u>Salary (estimated)</u>	<u>Cost</u>	<u>Category Totals</u>
.25	Environmental Quality Analyst VII	\$38,875	\$9,719	\$ 9,719

Fringes:

Based on a rate of 30% of salaries and wages (\$9,719) \$ 2,916

Travel:

-Project management - 3 trip to Chicago X
3 people per trip @ \$500 lodging and food/
transportation/person/night X 1 night/trip. \$ 4,500 \$ 4,500

Contractual:

Endangerment/Risk Assessment (EA/RA) \$ 55,000

Supplies:

Various supplies as needed to complete the EA/RA \$ 187

Equipment:

\$ 0

Indirect Costs:

Based on a rate of 19.967% of salaries and fringes \$ 2,522

Other Costs:

Audit rate (.03% of total less personnel, fringes,
and indirect costs) and other miscellaneous services
such as copying. \$ 156

TOTAL

\$75,000

APPLICATION FOR FEDERAL ASSISTANCE (Short Form)
PART II - BUDGET DATA

NEW CA
ALLIED/PORTAGE/KALAMA
ENFORCEMENT (B)

OBJECT CLASS CATEGORIES	CURRENT APPROVED BUDGET	CHANGE REQUESTED	NEW OR REVISED BUDGET
1. PERSONNEL	1-0-	\$9,719.00	\$9,719.00
2. FRINGES	1-0-	\$2,916.00	\$2,916.00
3. TRAVEL	1-0-	\$4,500.00	\$4,500.00
4. EQUIPMENT	1-0-	\$0.00	\$0.00
5. SUPPLIES	1-0-	\$187.00	\$187.00
6. CONTRACTUAL	1-0-	\$55,000.00	\$55,000.00
7. CONSTRUCTION	1-0-	\$0.00	\$0.00
8. OTHER	1-0-	\$156.00	\$156.00
9. TOTAL DIRECT	1-0-	\$72,478.00	\$72,478.00
10. INDIRECT	1-0-	\$2,522.00	\$2,522.00
11. TOTAL	1-0-	\$75,000.00	\$75,000.00
12. FEDERAL SHARE	1-0-	\$75,000.00	\$75,000.00
13. NON-FEDERAL SHARE	1-0-	\$0.00	\$0.00
14. PROGRAM INCOME			

15. DETAIL ON INDIRECT COSTS:

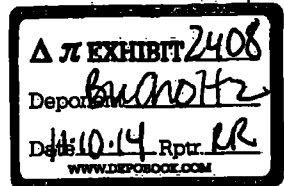
TYPE OF RATE (mark one box) ☐ PROVISIONAL ☐ PREDETERMINED
 ☒ FINAL ☐ FIXED

RATE	19.967 ¢	BASE	\$12,635.00	TOTAL AMOUNT	\$2,522.83
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PART III
PROGRAM NARRATIVE STATEMENT
(Attach additional sheets, if necessary)

SEE ATTACHED NARRATIVE.

**Site-Specific Amendment
To The Enforcement Agreement for State-Enforcement-Lead Sites in Michigan
for the
Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site**



I. Introduction and Background

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site (the site) was listed on the National Priorities List in 1980. Shortly thereafter, by agreement of the Michigan Department of Natural Resources (MDNR) and the United States Environmental Protection Agency (U.S. EPA), the site was designated as a non-fund financed, state-enforcement-lead site for purposes of conducting the remedial investigation/feasibility study (RI/FS).¹ This designation signified that the state of Michigan would either negotiate an agreement, enforceable under Michigan state law, with the potentially responsible parties (PRPs) pursuant to which the PRPs would agree to conduct the RI/FS; or use Michigan state law authorities to compel the PRPs to either conduct, or pay for the Michigan Department of Environmental Quality (MDEQ) to conduct, such work. The designation further signified, in accordance with the Superfund Memorandum of Agreement (SMOA) between the MDEQ and the U.S. EPA, dated December 26, 1989, that the RI/FS would occur under the primary direction of the MDEQ pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The January 23, 1991, site-specific agreement provided that the U.S. EPA would assume the support-agency role at the site, and would review all major documents as set forth in Table I of that agreement.

On December 28, 1990, the MDEQ and certain PRPs executed an Administrative Order by Consent (AOC) pursuant to which these PRPs agreed to conduct an RI/FS for the site. Since the execution of the AOC, RI/FS activities at the site have proceeded pursuant to the terms of that agreement.

The MDEQ and the U.S. EPA now believe that it is in the best interest of the public for certain areas of the site to be redesignated as federal-enforcement lead. This designation signifies that, for those areas of the site specified as the U.S. EPA enforcement lead in this amendment, the U.S. EPA will assume the primary responsibility for either negotiating any agreements, enforceable under federal law, with the PRPs for response activities at these areas; or using federal enforcement authorities to compel the PRPs to either conduct the necessary response activities, or pay the U.S. EPA to conduct such activities. The federal-enforcement lead designation further signifies, in accordance with the SMOA, that the U.S. EPA will have primary decision-making responsibility for response activities at those areas

¹In 1995, statutory authority and responsibilities of certain divisions of the MDNR were transferred to the Michigan Department of Environmental Quality (MDEQ). Henceforth, in this site-specific amendment (amendment), only the term MDEQ will be used.

Site-Specific Amendment

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specified as the U.S. EPA lead in this amendment. For those areas of the site redesignated as federal enforcement lead, the MDEQ will assume a support-agency role, with all of the duties and responsibilities set forth in the SMOA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. § 300 *et seq.*

Accordingly, this amendment establishes the roles and responsibilities of the U.S. EPA and the MDEQ at the site. This amendment represents the sole agreement between the U.S. EPA and the MDEQ concerning their roles and responsibilities at the site, and supercedes any previous site-specific amendment between the U.S. EPA and the MDEQ, including the site-specific amendment dated January 23, 1991. This amendment supplements the terms and conditions of the SMOA. In the event of any conflict between the terms of the SMOA and this amendment, the terms of this amendment are controlling.

II. Roles and Responsibilities

A. Enforcement Lead Status by Area of Contamination at the Site

The MDEQ has divided the site into a number of areas of contamination. Further, the "Supplemental Kalamazoo River Sediment and Floodplain Soils Sampling Plan" (April 2000), negotiated and agreed to by the MDEQ and the PRPs for the RI/FS of the Kalamazoo River (the river), divides the river into two phases: Phase I includes the river from Morrow Pond Dam to Lake Allegan Dam; Phase II includes the river from Lake Allegan Dam to Lake Michigan. The following list identifies each area of the site at which response activities either have been performed, or at which the MDEQ and the U.S. EPA currently believe response activities may be required, and states the agreement of the U.S. EPA and the MDEQ with regard to each such area:

1. **Allied Paper Landfill:** The MDEQ is currently overseeing the RI for the Allied Paper Landfill. Unless otherwise agreed to by letter agreement of the MDEQ and the U.S. EPA, the MDEQ will retain the enforcement lead for the Allied Paper Landfill until such time that the MDEQ approves a PRP-drafted RI report; or the MDEQ determines, under the terms of the AOC, that the PRP-drafted RI report for this landfill is disapproved and an approvable modification is developed by the MDEQ.

Site-Specific Amendment

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2. Willow Boulevard/A-Site: The MDEQ currently has the enforcement lead for this area of the site. On October 8, 2001, the MDEQ disapproved the RI and focused feasibility study (FFS) prepared by the PRPs for the Willow Boulevard/A-Site. Unless otherwise agreed to by letter agreement of the MDEQ and the U.S. EPA, the MDEQ will modify the document, consistent with the AOC. The MDEQ is in the process of correcting deficiencies and finalizing the RI/FFS.

After the MDEQ has finalized those documents, which the MDEQ currently anticipates to occur by the end of January 2002, they will be submitted to the U.S. EPA. The U.S. EPA will then assume the enforcement lead and the MDEQ will become the support agency for this area of contamination.

3. King Highway Landfill: In 1997, the MDEQ issued a Record of Decision (ROD) for this landfill, with which the U.S. EPA concurred in 1998. The MDEQ negotiated a separate AOC with one of the PRPs to conduct the remedial action required by the ROD (including installation of a monitoring network), and construction is almost complete. The MDEQ will retain the enforcement lead, and the U.S. EPA will continue to be the support agency, for this area of the site. The MDEQ will ensure that all required operation and maintenance is performed in a manner consistent with the requirements of the NCP at 40 C.F.R. § 300.435(f). Because hazardous substances at this landfill were left on-site, the U.S. EPA will conduct a review of the effectiveness of the remedy five years after the initiation of the remedial action, and every five years thereafter. See, e.g., 42 U.S.C. § 9621(c). The U.S. EPA will assume responsibility for performing any five-year reviews, with the MDEQ in a supporting role for this task.
4. 12th Street Landfill: The MDEQ recently issued a ROD for this landfill, and the U.S. EPA concurred with the remedy selected by the MDEQ on September 28, 2001. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead for the 12th Street Landfill, to negotiate an agreement with the PRP(s) to perform the remedial action required in the ROD. The MDEQ will assume the role of the support agency at this area.
5. Kalamazoo River (Phase I): This area of contamination comprises the river between Morrow Pond Dam and Lake Allegan Dam. To date, certain PRPs have performed significant RI activities on this portion of the river, and in October 2000, the draft RI/FS report was submitted by these PRPs pertaining to this area. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for Phase I of the river.

Site-Specific Amendment

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6. **Kalamazoo River (Phase II):** This area of contamination comprises the river from Lake Allegan Dam to the mouth of the river at Lake Michigan. To date, certain PRPs have performed some RI activities regarding this part of the river, but no RI report has been prepared. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for Phase II of the Kalamazoo River.
7. **Georgia Pacific Five Former Lagoons:** Residuals located in these lagoons were disposed of in the King Highway Landfill as part of the remedial action for that landfill. No further action is anticipated at this area. In the event that additional response activities are later required, the MDEQ will assume the enforcement lead, and the U.S. EPA will assume the support-agency role, for such response activity.
8. **King Mill Lagoons:** Some contaminated materials at this area of the site were placed in the King Highway Landfill as part of the remedial action for the landfill. An RI has not been conducted for this area of concern. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for the King Mill Lagoons.
9. **Hawthorne Paper Mill:** Polychlorinated biphenyls have recently been detected at this area of the site, and the MDEQ believes that some response activity may be necessary to ensure that the area is not an ongoing source to the river. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for the Hawthorne Paper Mill.

With regard to any area of the site for which the MDEQ has not been specifically designated the lead-enforcement agency in this Section II. A, but at which response activities are or become necessary, the MDEQ and the U.S. EPA agree that the U.S. EPA will assume the enforcement lead and that the MDEQ will assume the support-agency role.

B. Administrative Record

The MDEQ will provide the U.S. EPA with a copy of the complete administrative record for each area of the site for which the U.S. EPA will assume the enforcement lead under the terms of this amendment, including available databases and computer files. The MDEQ further agrees that, with regard to each area of the site for which the MDEQ will retain the enforcement lead pursuant to the terms of this amendment, it will maintain an administrative record that complies with the recordkeeping requirements of the NCP, 40 C.F.R. § 300.800 et seq.

Site-Specific Amendment

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C. Other Matters

1. Correspondence

The MDEQ and the U.S. EPA agree that, unless already provided, the MDEQ project manager(s) and the U.S. EPA remedial project manager(s) will provide each other with copies of all correspondence between such project manager and any PRP (or its contractor).

2. Deliverable Documents

The MDEQ and the U.S. EPA agree to ensure that, whenever a letter, report, or other document, in either draft or final form, is delivered to the enforcement-lead agency under the terms of an agreement between that agency and the PRPs, a copy is simultaneously provided to the support agency.

3. Review times

Attachment B to the SMOA provides a list of response process submittals, review/oversight activities, and the turnaround time frames to be followed by the lead and support-agency project managers at a state or federal-lead Superfund site. The time frames specified in the SMOA may be altered by mutual agreement of the U.S. EPA's support-agency coordinator and the MDEQ's state project manager.

4. Modification

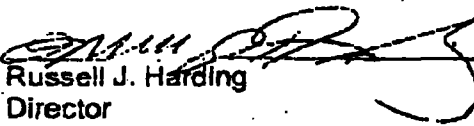
This amendment may be revised as provided in Section II. A, above, or otherwise by mutual agreement of the two agencies.

Site-Specific Amendment

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Executed and agreed to on this February day of ~~January~~ 2002.

For the State of Michigan, Michigan Department of Environmental Quality:


Russell J. Harding
Director

1/9/02
Date

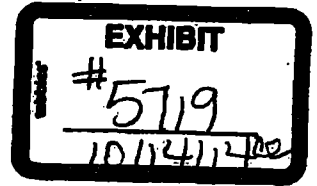
For United States Environmental Protection Agency, Region 5:


Thomas V. Skinner
Regional Administrator

2/15/2002
Date



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY



In the Matter of:

Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund (National Priorities List) Site
Kalamazoo and Allegan Counties, Michigan

MDEQ Reference No.:
AOC-RRD-2007-002

ADMINISTRATIVE ORDER BY CONSENT
FOR
TERMINATION OF FINAL ORDER NO. DFO-ERD-91-001

This Administrative Order by Consent for Termination of Final Order No. DFO-ERD-91-001 (Order) is entered into voluntarily by and between the Michigan Department of Environmental Quality (MDEQ) and the Michigan Department of Attorney General (MDAG), collectively the "State"; Millennium Holdings, LLC (MHLLC), formerly known as HM Holdings, Inc. and Allied Paper, Inc., and Georgia-Pacific LLC (GP), formerly known as Georgia Pacific Corporation, collectively the "Respondents"; pursuant to the authority vested in the MDEQ and the MDAG by Sections 20119 and 20134(1) of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.20101 *et seq.* This Order concerns the termination of the Administrative Order by Consent, Final Order No. DFO-ERD-91-001 (State 1990 AOC), and reimbursement of the MDEQ costs incurred in association with the development of the final remedial investigation report of the Allied Paper Landfill (OU1 RI Report) of the listed Superfund site known as the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site).

RECITALS

1. On December 28, 1990, the State and Respondents, collectively the "Parties," entered into the State 1990 AOC that required the preparation of, performance of, and reimbursement of oversight costs for the remedial investigation and feasibility study (RI/FS) for the Site. The objectives of the State 1990 AOC were: (a) to determine the nature and extent of contamination and any threat to the public health or welfare, or the environment caused by the

release or threatened release of hazardous substances, pollutants, or contaminants from the Site by conducting a remedial investigation; and (b) to determine and evaluate alternatives for remedial action (if any) to prevent, mitigate, or otherwise respond to or remedy any release or threatened release of hazardous substances, pollutants, or contaminants from the Site by conducting a feasibility study.

2. In February 2002, the MDEQ and the U.S. Environmental Protection Agency (U.S. EPA) entered into a Site-Specific Amendment to the Superfund Memorandum of Agreement, dated December 26, 1989, designating certain areas of the Site as federal enforcement lead. Subsequently, the U.S. EPA and Respondents have entered into an Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (Federal SRI/FS AOC), attached hereto as Exhibit A, which concerns the preparation and performance of supplemental remedial investigations and feasibility studies (SRI/FS) at the Site. The objectives of the SRI/FS are, in part, to: (a) supplement existing information in determining the nature and extent of contamination and any current or potential threat to the public health or welfare, or the environment posed by the release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site and to collect sufficient additional data, for developing and evaluating effective remedial alternatives by conducting supplemental remedial investigations for areas of the Site identified in the SRI/FS statement of work (SOW); and (b) identify and evaluate remedial alternatives that protect human health and the environment by preventing, eliminating, reducing, or controlling any release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site by conducting feasibility studies for areas of the Site as more specifically set forth in the SOW.

3. The Parties agree that the objectives of the Federal SRI/FS AOC are consistent with the objectives of the State 1990 AOC. Therefore, in recognition that portions of the Site, including the areas of the Site that are the subject of the SRI/FS, have been designated as federal-enforcement lead, it is appropriate to terminate the State 1990 AOC.

4. The signatories to this Order certify that they are authorized to execute it and legally bind the parties they represent.

5. The execution of this Order by Respondents is neither an admission of liability by either party with respect to any issue covered under this Order, nor an admission or denial of any findings of fact or legal determinations stated or implied herein.

TERMS OF AGREEMENT

Accordingly, in consideration of the recitals set forth above, the Parties hereby agree that:

6. Parties Bound. This Order shall apply to and be binding upon the Parties and their successors and assigns.

7. Termination of the State 1990 AOC. Upon: (a) the MDEQ's receipt of Respondents' payment of \$287,714.90 in reimbursement of the State's response activity costs incurred in 2006 under the State 1990 AOC, and (b) the complete execution of this Order, the State 1990 AOC (including without limitation, the financial assurance obligation) is terminated.

8. Reimbursement of the MDEQ's Costs by MHLLC.

(a) Except as provided in this paragraph, MHLLC shall pay to the State the sum of Forty Thousand Dollars (\$40,000) as reimbursement of the MDEQ's response activity costs incurred and paid in connection with the finalization and submittal of the OU1 RI Report (state-approved OU1 RI Report) to the U.S. EPA. If the U.S. EPA approves the state-approved OU1 RI Report without the need for MHLLC to modify the OU1 RI Report, then MHLLC shall pay the State the agreed upon sum within thirty (30) calendar days of receiving notice from the U.S. EPA that the OU1 RI Report is approved by the U.S. EPA.

(i) If MHLLC receives written notification from the U.S. EPA that the U.S. EPA has concluded that the state-approved OU1 RI Report requires modification and such modifications pertain to data or information gathered for or included in the state-approved OU1 RI Report, costs incurred by MHLLC in modifying the state-approved OU1 RI Report may be deducted from the \$40,000, but costs eligible for deduction shall not exceed \$40,000.

(ii) In the event the U.S. EPA directs MHLLC to undertake additional response activities and to incorporate new data or information beyond that included in the state-

approved OU1 RI Report, costs incurred by MHLLC in association with undertaking those additional response activities and incorporating the new data into the state-approved OU1 RI Report shall not be eligible for deduction from the \$40,000 owed by MHLLC to the State.

(iii) In the event MHLLC incurs costs that are eligible to be deducted from the \$40,000 as described in subparagraph 8(a)(i), MHLLC shall, within thirty (30) calendar days of completion of the U.S. EPA-directed modifications to the state-approved OU1 RI Report, provide documentation to the MDEQ that sets forth, with reasonable specificity, the nature of the eligible costs. Payment of the adjusted amount to the MDEQ shall be due within thirty (30) calendar days of the Respondents' receipt of written notification from the MDEQ of the final adjusted amount to be paid.

(b) If MHLLC fails to make payments as required under Paragraph 8(a) of this Order pursuant to the schedules set forth therein, MHLLC shall also pay the MDEQ interest on the unreimbursed amount at the rate provided for in Section 20126a(3) of the NREPA.

(c) Payments pursuant to Paragraph 8(a) of this Order shall be made by certified check made payable to the State of Michigan, Environmental Response Fund; shall identify the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site and the MDEQ Reference No. AOC-RRD- 2007-002; and shall be mailed to:

Revenue Control Unit
Financial and Business Services Division
Michigan Department of Environmental Quality
P.O. Box 30657
Lansing, MI 48909-8157

Via Courier:

Revenue Control Unit
Financial and Business Services Division
Michigan Department of Environmental Quality
Constitution Hall, 5th Floor, South Tower
525 West Allegan Street
Lansing, MI 48933-2125

A copy of the transmittal letter and the certified check shall be provided simultaneously to the MDEQ Project Coordinator:

Paul Bucholtz
Superfund Section
Remediation and Redevelopment Division
Michigan Department of Environmental Quality
P.O. Box 30426

Lansing, Michigan 48909-7926

(d) Costs recovered pursuant to this Order shall be deposited in the Environmental Response Fund in accordance with the provisions of Section 20108(3) of the NREPA.

9. Other Claims. Nothing in this Order shall constitute or be construed as a release or covenant not to sue regarding any claim, cause of action, or demand in law or equity against any person, firm, trust, trustee, joint venture, partnership, corporation, or other entity, for any liability it may have arising out of or relating, in any way, to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Site. This Order shall not estop or limit any legal or equitable claims of the State against the Respondents, their agents, contractors, or assigns, including, but not limited to, claims related to the releases of hazardous substances or other pollutants or contaminants. Respondents further waive all other statutory and common law claims against the State for costs of conducting the RI/FS, including the OU1 RI Report, and any contribution and counterclaims for such costs. Respondents agree to withhold any judicial challenge relating to or arising out of the performance of this Order until the issuance of the final Record of Decision for Operable Unit 1.

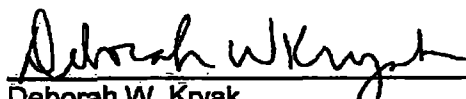
10. Termination of this Order. Except for the provisions of Paragraph 9, all other provisions of this Order shall terminate upon the date the Respondents receive notification from the MDEQ that the obligations under Paragraph 8 of this Order have been fulfilled.

11. Effective Date. This Order shall become effective on the date it is fully executed by all Parties to it.

In the Matter of:
MDEQ Reference No. AOC-RRD-2007-002

IT IS SO AGREED BY:

MILLENNIUM HOLDINGS, LLC



Deborah W. Kryak
Director, Retained Liabilities and Remediation

9/24/07

Date

GEORGIA-PACIFIC LLC

J. Michael Davis
Principal Counsel

Date

In the Matter of:
MDEQ Reference No. AOC-RRD-2007-002

IT IS SO AGREED BY:

MILLENNIUM HOLDINGS, LLC

Deborah W. Kryak
Director, Retained Liabilities and Remediation

Date

GEORGIA-PACIFIC LLC



J. Michael Davis
Principal Counsel

SEPTEMBER 14, 2007
Date

In the Matter of:
MDEQ Reference No. AOC-RRD-2007-002

IT IS SO AGREED BY:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY




Andrew W. Hogarth, Chief
Remediation and Redevelopment Division

9/28/07

Date

MICHIGAN DEPARTMENT OF ATTORNEY GENERAL



Polly A. Syrk (P 69473)
Assistant Attorney General
Environment, Natural Resources, and Agriculture Division

9-27-07

Date

EXHIBIT A

**Administrative Settlement Agreement and Order on Consent
for Remedial Investigation/Feasibility Study
at the
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site**